THE TRADE REVIEW
—AND—
WESTERN MACHINIST.

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NEW MACHINERY.

THE BALL ENGINE GOVERNOR.

The object of a governor is to keep an engine at uniform speed under changes of load; in other words, the governor is an automatic device for the control of the speed of an engine. Two distinct methods by which steam supplied to an engine is brought under control have been all but universally adopted. The first is universally applied to slide valve engines having a fixed cut-off, and consists in the adjustment of a valve by which the pressure system in the cylinder is increased or diminished in order to maintain a constant rate of revolution with a variable load. The second device consists in a mechanism by which the whole boiler pressure is admitted to the cylinder, which is allowed to follow the piston to such portion of the stroke as will maintain a regular rate of revolution; the steam is then suddenly cut off at each half revolution of the engine, thus furnishing a greater or less volume of steam at an equal pressure. Neither of these two varieties of governors will act until a change in the rate of reduction of the engine occurs, and this change will either admit more or less steam, as it is faster or slower than that for which the governoo is adjusted.

In the Ball steam engine governor, the construction of which we illustrate, the action of the ball and that of the

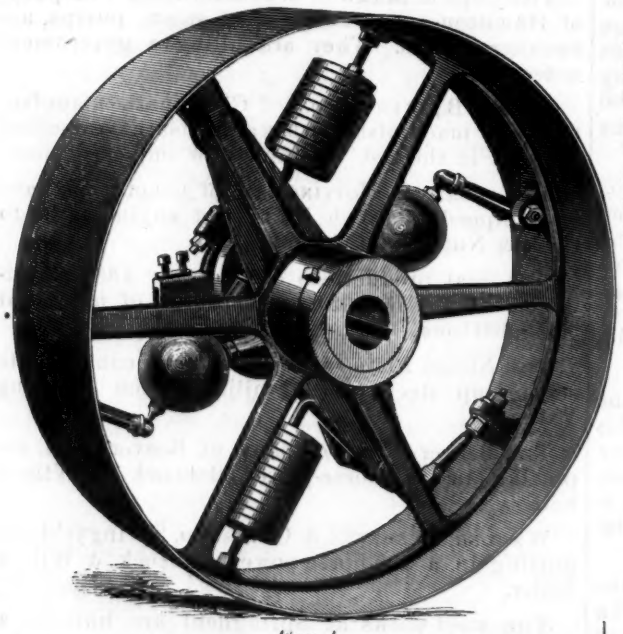


Fig 1

valve are such as do away with irregularities of motion in the engine In a most effective way, rendering it certaiu that the speed will average right, so securing utmost econemy for engine and machine, as well as best available work. Defects, which heretofore have been considered unavoidable, disappear under its action. The engravings show this governor as constructed to automatically control a single valve engine.

The main eccentric has an oblong shaft opening, and swings across the shaft with a pendulum movement, as is common with most single valve automatic engines. It is moved or swnng by the action of another eccentric, mounted on the shaft by its side, the ing of which engages a stud projecting from the side of the main eccentric. It will be seen that the oscillation of this secondary eccentrlc forward and backward, causes the main eccentric to swing across the shaft, which action controls the admission of steam in the usual manner with this class of

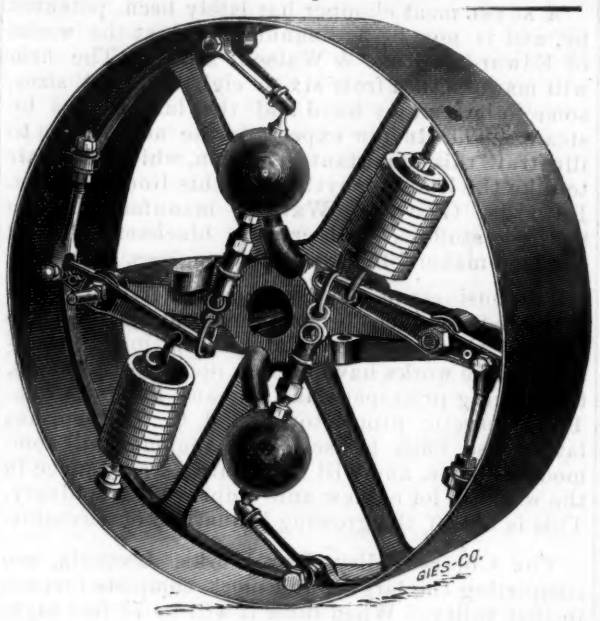


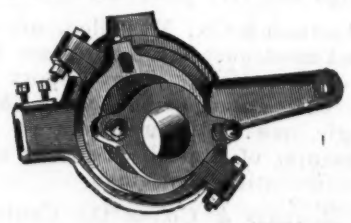
Fig 2

engines. This secondary eccentric has a sleeve surrounding the shaft, and projecting through the oblong hole in main eccentric, and screwed thereon is a nut which covers the oblong hole and keeps the main eccentric in contact with secondary eccentric. The oscillating motion we have referred to is caused by the combined action of weights and springs, communicated through the ball and socket joints on the outer side of secondary eccentric.

Fig. 1 is a view of governor from outside of engine.

Fig. 2 is a view from inside.

In Fig. 3 the eccentrics are detached, and are shown inverted in Fig. 4, which shows the manner of connecting with ball and socket joint.



The centrifugal force of the weights is opposed by springs in the usual way, and the result of these forces is communicated to the eccentric by which the governing is effected. To correct, however, the defects accompanying this arrangement in the usual form of governor, the driving or belt pulley is made to form a part of the governor, and is mounted loosely on the hub of an arm which is keyed to the shaft.

The extremities of this fixed arm have studs, on which are pivoted levers having one end attached to the weights and springs, and the other end connected with the rim of the driving wheel, forming the means by which the wheel is driven. With this arrangement the load is constantly being weighed by the governor, and any change of load is immediately recognized and acted upon by the governor. The weights and springs furnish the necessary stability, and the load force is only used in sufficient quantity to bring about the changes of speed.

A very ingenious indicator was used to produce the speed diagrams which we publish as a record of the practical workings of this governor. A weight was suspended in the balance wheel, with a spring to oppose the centrifugal force. During one-half of each revolution gravity drew the weight toward the center, and when in the opposite position gravity drew it away from the center. The result was a constant vibration, corresponding with eadh revolution of the engine. This motion caused a pencil to move up and down before a revolving paper cylinder, making the diagrams as they appear, in which the length of each line indicates exactly the rate of speed for that revolution, showing how little was the vibration between an entirely empty and full load. An engine was arranged to be under the control of the new governor, or at pleasure to be controlled by one of the usual form of governors—one which deservedly stands high as to excellence of performance. Diagram A was taken with this governor, and is the best sample that could be obtained. Diagram B was taken with the new governor. In all the diagrams the load was suddenly thrown on before

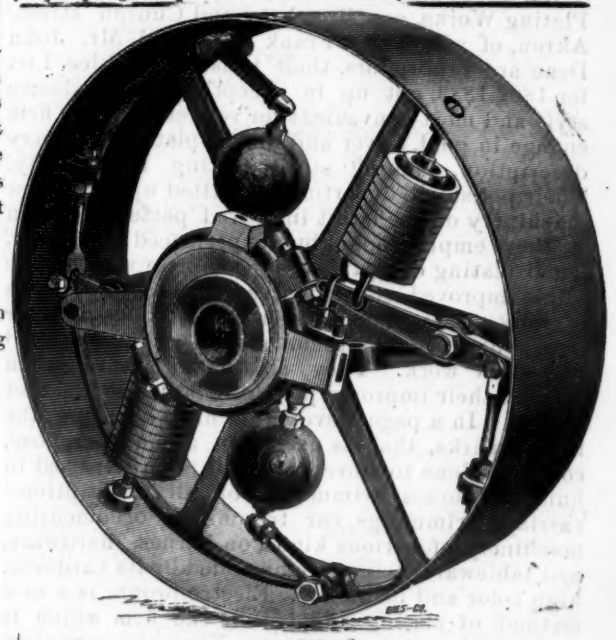
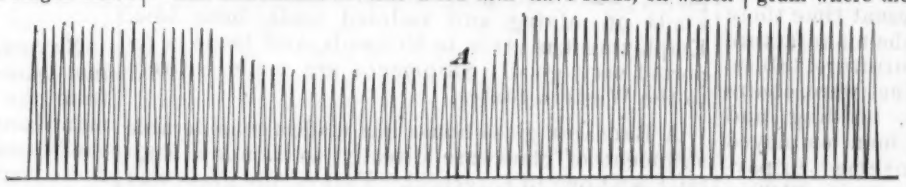


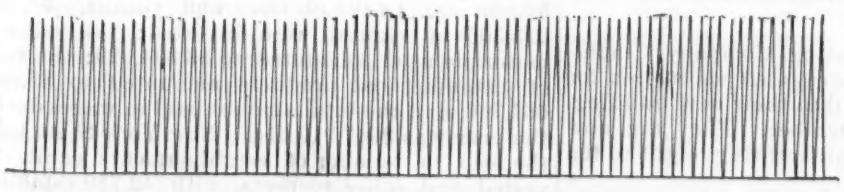
Fig 3

reaching the middle of diagram, and as suddenly thrown off in the latter part of diagram. It is very evident, in diagram A, where the load was met and where released; diagram B furnishes no evidence of these points. A slight disturbance in the early part of the diagram may have been caused by the shock of the load; but it cannot be known from the diagram where the load ceased. Diagram C is given as a curiosity, and to illustrate the capabilities of this governor. In this case the governor was adjusted to accelerate the speed of the engine under load, and the duration of load is clearly marked by acceleration of speed. This is certainly a phenomenon in the performance of steam engine governors, and would seem to demonstrate that the matter of relative speed between "loaded" and "unloaded" is under control.

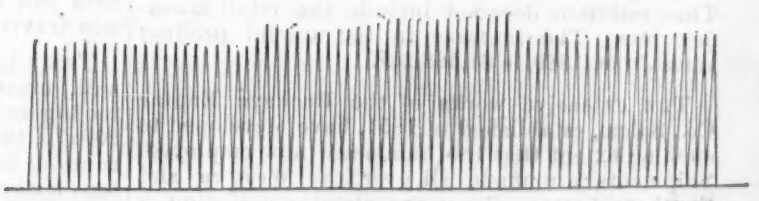


A

B



C



MANUFACTURED BY THE BALL ENGINE CO., ERIE PA.

MANUFACTURE .

TO MACHINISTS, MANUFACTURERS AND OTHERS.

THE publishers of THE TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinist and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised before sending to press.

OHIO INDUSTRIES.

CLEVELAND.

THE Standard Rivet Company, 100 Leonard st., began in September to manufacture boiler, bridge, and tank rivets, and are now running full capacity.

MESSRS. Samuel and W. G. Mather, under the firm name of Mather Bros., have recently opened a a store at 101½ Water street for the sale of pig iron and iron ores.

THE Cummer Engine Company, will commence to manufacture steam engines by January 1st. They are building and placing special tools in their new main building—230x60, two stories—and are fitting the foundry building, 220x60, with two cupolas, cranes and necessary machinery. The works will be lighted by sixteen 2,000 candle power Brush electric lamps, and will use a system of electric bells to the tool room and throughout the works. Nearly one half of the buildings are completed, and the others will be built next season. The main building, when finished, will be 400 feet long.

OHIO IN GENERAL.

WE have received from the Akron Polishing and Plating Works, cor. Broadway and Church street, Akron, of which Mr. Frank Root and Mr. John Dean are proprietors, their illustrated Price List for 1882-1883, got up in exceptionally handsome style and most convenient for reference. The firm engage in gold, silver and nickel plating of every description, making stove plating a specialty. Their polishing department is fitted up with new machinery of the latest improved patterns, and in it they employ none but experienced workmen. Their plating department is complete with all the latest improved conveniences for doing all classes of work, besides some important methods of their own, which enable them to turn out unexcelled first-class work. They also manufacture when ordered their improved polishing lathes and leather wheels. In a page devoted to nickel plating, the firm remarks, that its use is not as many suppose, confined alone to stove work, but is largely used in finishing brass trimmings of all descriptions, carriage trimmings, car trimmings, ornamenting machinery of various kinds, on harness, hardware, and tableware, being recommended by its hardness, high color and brilliancy. Electro-bronze is a new method of plating adopted by the firm which is desirable for many purposes. They also manufacture solid and wood center leather wheels by their improved process, and which polishers find superior for many classes of work.

OF all the great manufacturing cities, Cincinnati maintains itself at the head of furniture production. The furniture trade throughout the whole country engages 80,000 workmen, and the annual product is $110,841,000. At the present time there are 133 factories in Cincinnati for the manufacture of all kinds of furniture, cabinet furniture, tables, hat-racks, parlor frames, fancy cabinet-ware, chairs unholstered furniture, mattresses, bedding and spring beds, etc. The number of men employed is 5,764. The amout of money consumed in paying a year's wages for all the employes is $2,261,428, and the total annual product is $7,573,856. This estimate does not include the retail manufacturers. The increase in the annual product since June, 1880, is $1,568,207.

THE extensive works of the Buckeye Engine Co., Salem, established in 1851, have developed to such an extent that 180 hands are now employed. Shipments are made all over the Western and Southern States. They are about completing a large engine for the Pullman Car Co., of Chicago, of 28-inch bore, 56-inch stroke and 600-horse-power—the second engine built by them for the Pullman Co. Several others of smaller size are also under way. Trade is reported very good but scarcely as good as last season. The shop is illuminated by 20 electric lights.

THE new works of the Ravenna Flint Glass Company (Limited) began operations on November 20, with 72 hands. Frank Wolpert is president and William Grinnell secretary and treasurer. The main building is a square frame structure 65 feet each way and 16 feet high. The mixing room is 12x40; the learway building 12x50; the packing room 40x60, and the office 16x24. The main product of the works is the lead lamp chimney, a superior article of fine finish. The output will be about 1,000 boxes of chimneys a week, six dozen to a box.

A NOVEL meat chopper has lately been patented by, and is now being manufactured at the works of Edwards, Grove & Watson, Salem. The firm will manufacture from six to eight different sizes, some to be run by hand and the larger ones by steam. The REVIEW expects in the near future to illustrate this important invention, which bids fair to take the lead of anything in this line. Messrs. Edwards, Grove & Watson manufacture also suasage stuffers, lard presses, blacksmiths' and carriage-makers' tools, portable engines, etc.

THE business of the Leetonia Boiler Works has increased to such proportions than an enlargement of shop-room has lately been made necessary. The works have been in operation 12 years, trade being principally in Ohio and Pennsylvania. The energetic proprietor, Mr. J. C. Thullen, has lately also built himself a convenient and commodious office, and will the coming season place in the works a lot of new and improved machinery. This is one of the growing industries of Leetonia.

THE Cherry Valley Iron Works, Leetonia, are completing the largest and most complete furnace in that valley. When done it will be 75 feet high, with 16-foot bosh. They are also building a new hoist house and tower. Eight hundred hands are employed. The annual business amounts to not less than $1,500,000, the monthly pay-roll footing up $25,000 to $30,000. The company own 1,400 acres of coal land from which they mine 7,000 tons of coal monthly.

THE Industrial Works of Lodge, Barker & Co., in Cincinnati, are working 50 men. They received a medal for highest degree of merit on engine lathes at the Tenth Cincinnati Industrial Exposition, and are shipping many both East and West. They are now ready to put upon the market a new 26-in. screw-cutting engine lathe, of new and elegant design and very powerful.

S. A. CONRAD & Co., Massillon, are one of the oldest and most successful hardware firms in this section of the State. They report trade very good for this season of the year. Mr. Harmon Shaidnagle, one of the members of the firm, is City Treasurer of Massillon, and is a very genial and accommodating gentleman.

G. J. ROBERTS & Co., of the Central Machine Works, at Dayton, are in their new building, 75x68, three stories, brick, at the corner of Second and Canal streets. This gives them double capacity and the needed additional facilities for the manufacture of the Roberts patent steam pump which they build in all sizes.

NOT a day since starting, in 1874, have the works of the Leetonia Tool Co., manufacturers of axes, picks, mattocks, grub shoes, hammers and all kinds of mining and railroad tools, been idle. Employment is given to 50 hands, and trade is reported very good. Shipments are made entirely to the Western States.

A BELLAIRE glass house has made a considerable shipment of glassware directly to London, England, and one to Liverpool. Part of the glass was packed in casks that had just been emptied of soda ash imported from England, and they will now travel back again.

THE Cincinnati Corrugating Company, Cincinnati, manufacturers of corrugated sheet iron for roofing and siding, moved into their new building, 200x75, two stories, in October. They are now running full capacity, manufacturing eight to ten tons a day.

THOS. SHARP & Co., Salem, manufacturers of automatic, variable cut-off and improved slide-valve engines, saw and flour-mill engines, etc., employ 12 hands and ship engines all over the country. The works were established in 1843.

THE Standard Coal and Iron Co. shows signs of activity again. W. D. Lee, of Newark, O., managing director, lately bought up the property of the New York Coal and Iron Co., assigned, and paid the creditors dollar for dollar.

THE Columbus Iron Works, Columbus, have 12 single puddling furnaces, 5 heating furnaces and 4 trains of rolls; product, merchant bars, splice bars, light T rails, wire of all kinds and iron for harness and saddle work.

THE Kittredge Cornice and Ornamental Works of Blakewell & Mullins, Salem, report a flourishing trade extending all over the Union. They have orders on hand to keep them running all winter and employ 45 hands.

TRADE is reported very good by Alfred F. Smith, metal spinner and nickel plater, Salem, orders coming in from Ohio and Western Pennsylvania. He employs 13 hands and has been running two years.

THE annual capacity of the Zanesville Iron Works, Zanesville, is 14,000 net tons of assorted merchant bar iron, light T and street rails, and railroad spikes; specialty, agricultural irons.

THE Columbus Rolling Mill, Columbus, has 10 single puddling furnaces, 14 heating furnaces, and three trains of rolls; product, iron and steel rails; annual capacity, 40,000 net tons.

THE annual capacity of the Massillon Rolling Mill, Massillon, is now 6,000 net tons. The Dover Mill, at Canal Dover, also produces the same quantity.

THE Ward Iron Company, New Philadelphia, are erecting a rolling mill to contain 20 single puddling furnaces, 4 heating furnaces, and 4 trains of rolls.

THE Cope & Maxwell Manufacturing Company, of Hamilton, manufacturers of steam pumps, are running nights. They are filling a government order.

LODGE, BARKER & Co., of Cincinnati, manufacturers of machinists' lathes and tools, have doubled capacity in the last year and now employ 50 men

MCFARLAN & NOTTINGHAM, of Cincinnati, have just shipped a 36-inch by 24 feet engine lathe to Cook & Nutting, of Atlanta, Ga.

THE coal productions of Ohio for 1882 is estimated by Mr. Roy, State Inspector of mines, at 9,450,000 tons.

THE Nickel Plate railroad company contemplate setting up steel rolling mills in the Hocking Valley.

THE Beaver Wire Company, of Beaver Falls, are putting in 275-horse-power Babcock & Wilcox boiler.

WARDER, BUSHNELL & GLASSNER, Springfield, are putting in a 300-horse-power Babcock & Wilcox boiler.

THE steel works at Springfield are building a Siemens-Martin steel plant and a mill to roll the product.

THE Enterprise Glass Company, Ravenna, are full of orders, and great activity prevails at their works.

THE Niles Tool Works, at Hamilton, have a new addition to their pattern shop, 44x35, two stories.

NATIONAL INDUSTRIES.—A special census bulletin just issued contains a table of statistics compiled from the census returns of 1880, relating to all manufacturing industries (except gas) in each of the States and Territories. This table shows that there were in the United States 253,840 establishments employing 2,025,279 males above sixteen years of age, 531,753 females above the age of fifteen, and 18,198 children and youths. $2,790,223,506 of capital were invested; the value of materials used amounted to $3,394,029; the value of manufactured products amounted to $5,369,667,766, and the total amount paid in wages during the year was $947,919,614. New York State takes the lead in number of establishments, capital invested and other respects, with 42,739 establishments; Pennsylvania is second, with 31,225, and Ohio third, with 20,699 establishments. Illinois has 14,549; Massachusetts, 14,352; Indiana, 11,198; Michigan, 8,873; Missouri, 8,592; New Jersey, 7,128, and Iowa, 6,221.

THE FUTURE OF STEEL MANUFACTURE.

THE NEW "BASIC PROCESS" AND ITS PROBABLE EFFECT ON THE IRON TRADE.

Interview With Jacob Reese by a Trade Review Reporter.

SPECIAL CORRESPONDENCE OF THE TRADE REVIEW.

PITTSBURGH, Pa., Nov. 23.—Mr. Jacob Reese, the eminent Pittsburgh metallurgist, was found at his office, 108 Diamond st., and cheerfully furnished your reporter with the information desired.

"Some note has lately been made, Mr. Reese, by journals throughout the country of the number of patents which Edison has taken out—a number stated to exceed that of any other individual, now as an inventor in the iron and steel line, may I ask you how many stand in your name?"

"I have more than 150 patents relating to the processes of production of iron and steel, and including the automatic machinery used in the manufacture and manipulation of iron and steel. One of these patents is what is known as the basic process—for the manufacture of iron and steel. All the iron and steel hitherto made has been produced by the acid process, but only 1 10 of the native ores have such a composition, that they can be used successfully. Many impurities still remain in the phosphoratic or native ore which the acid process will not eliminate. Now, the basic process successfully removes, in addition to phorous, many other impurities. This process can be used in the treatment of all ores, thus greatly diminishing the cost of production, for at a time when ores which are used in the acid process can be delivered at a furnace at $9 per ton, phosphoratic ores of the same quality can be delivered for $4, and metal can be made by basic process. Thus it will be seen that if the basic process is introduced, the mills using the acid process cannot compete with them, and a great change will take place in the metallurgy of iron and steel. There is at present litigation between the Bessemer steel companies and myself in regard to who is owner of this process. I sold them some time ago nine patents, but none of them covered the basic process. The Bessemer men claimed they intended to buy the process and so filed a bill in equity, but what will be the result? Only the courts can decide unless some compromise is entered into, which at present is hardly possible. As I have stated, all the iron and steel made in this country hitherto has been done by the acid process, and to introduce this new process, which will reduce the cost of production from $4 to $7, will indeed make a most important change. To show that in the near future this process will come to be generally adopted, I will give you the names of some of the firms that are negotiating with me for a license to use the process: The Reading Railroad Co.; Burden Iron Co., Troy, N. Y.; Rhone Iron and Steel Co., of Chattanooga, Tenn.; Virginia Iron and Steel Co.; Valley Iron Co., of Youngstown, O.; Nickel Plate R. R., who contemplate putting in a plant in the Hocking Valley; St. Louis Steel Co.; the Wheeling Steel Syndicate, and many other concerns.

"The litigation has delayed these matters very much. There is a great interest to the iron men of the country in this litigation, for if the Bessemer steel companies, which constitute a vast monopoly, gain possession of this patent, the smaller mills will go under and the monopoly will cover the whole iron and steel industry. On the other hand, should I control the process and possess the license, the iron mills all over the country who are now manufacturing iron by the puddling process, will be constrained to adopt it. It is a fact that the Bessemer steel men to-day have a capacity to produce more than 1,000,000 tons per annum, of steel, than is used for steel rails. They are now putting in machinery for making the surplus into merchant and bar shapes, and as there is only 1,750,800 tons of iron used in this country, it will take away more than half of the iron trade and leave iron men in the cold. The new basic process will dispense with puddling furnaces and coal-consuming boilers, as the metal will be worked direct from the blast furnace without the use of fuel except that used in the blast furnace for smelting the ores, and the steam for rolling will be secured by utilizing the waste heat of the blast furnace."

CORRESPONDENCE.

FROM OUR SPECIAL TRAVELING CORRESPONDENT.

PITTSBURGH, Pa., November 28.

The "city of smoke" is covered with a veritable pall of darkness. A foggy atmosphere usually prevails from October to February. The sun shining so brightly in the country around Pittsburgh, here bears the cheerless aspect of a molten ball, an ill-defined disc of sombre light.

There was during last week considerable stir in the iron and steel market, caused by the reports from east and west of steel rail mills being closed, and about to close. Every other market being in sympathy with the steel market the effect of the drop in steel rails is felt in all business circles east and west. The first intimation of a break came from the Bessemer steel mills of Chicago and St. Louis, followed by a scare from Scranton, Pa., on Monday of last week, but as soon as Pittsburgh steel men considered the great advantage they had in the production of steel over every other market, and the fact that a number of other steel competitors will be obliged to close before they do, leaving to a great extent the supply of the market to those who can produce cheapest, and also recalled the fact that their busiest productive period they have experienced was during the panic of 1877, they subsided into their wonted calm. Thomas Carnegie, of the firm of Carnegie Bros. & Co., limited, the owners of the Edgar Thompson Steel Works at Braddock, Pa., the largest steel rail manufacturers in the United States, remarked to your reporter: "This drop is to be attributed to over-production. There are not to be as many steel rails laid next year as there have been this year. The Bessemer companies entered into active competition to obtain their share of the trade. The Scranton mills cannot make rails at $40, but still they do not lose as much as they would by lying idle. We have extraordinary facilities for making steel. We make our own coke, make our own iron, and dig our own fire fuel, so that we get every article that we use at the lowest possible cost, yet, you may expect to see us close if the market goes below the cost of production. We have orders that will keep us busy for four months—orders for 56,000 tons. The Cambria Iron Company have orders for 60,000 tons, the Pennsylvania Steel Company for 60,000 tons, Bethlehem Iron Company for 54,000 tons, all for delivery next year, and all are for $45 on the cars at the works. So you see there is no danger of any of these firms closing. The shutting down of western mills will not make the market go up but will tend to keep it from going down. But steel rails will be quoted at $40 for some time." In regard to iron, Mr. Carnegie observed: "There can be no further drop in iron, as there has been in steel, for the market is as low as it can fall to leave any market at all." All the iron mills of Pittsburgh are running on full time at present, and seem to have plenty of orders for some time, yet they are careful not to over-stock, all fearing some sort of stir in the market, and everyone is trying to avoid being caught napping. Most all iron men coincide in the opinion that the cost of production must come down in order to get through this squeeze successfully. The coming change of power, and the advent of the Democratic Congress makes the market uncertain, as any anticipated change of policy always does, but it is only a minor cause in this fall in iron and steel. The supposition that it is the design of large capitalists to cause stocks to drop, all the small mills to close, and then, after loading themselves sufficiently, to open up their mills and conclude that they will continue, is not warranted by the turn affairs have taken. It is an assured fact that small concerns will stop first, but as to its being a design of the Bessemer steel companies to squeeze out the small concerns is absurd. This is the time of the year for the market to be low, and the prospects are that by the time the concerns have filled their present orders, iron and steel will be looking up, and everything will be serene.——The boiler manufacturers report business very quiet, especially during the last ten days.——The Fort Pitt Boiler Works say that they have not known so quiet a time for many months——Mr. John Roney, the veteran XXX heating stove man, is doing a booming business now, but is preparing to have it quiet down.——The H. Northrop Roofing Company are sending their excellent roofs as far west as Montana, and have a ready market for all their goods. In fact all specialties are doing a splendid business. The drop in iron and steel has not yet had its effect upon the specialty market.——The Monongahela Bridge Company, of which Mr. Hostetter, of Hostetter & Smith, is president, are building a new bridge. Their capital stock is $450,000, and their dividends are realized by toll, which make it a splendid investment. I may add as an interesting item that the old Monongahela bridge at the foot of Smithfield street was one of the first wire cable suspension bridges constructed in this country. It was built by the late Mr. Roebling, the well-known bridge engineer. Its length was about 1,500 feet, the full width of the river at that point forty years ago. Since then the river became narrowed by filling and deposits on the south shore, about 100 feet. The old suspension bridge, consisting of eight spans of 180 feet each, grew inadequate to the increasing travel over it and especially to the heavy loads of castings, forgings, coal, coke, and other material for mills. Often loads of 20 tons on four wheels were offered, for which the undulating cable bridge was never intended; further, the demands of navigation increased, and more height under the bridge, as well as greater width of spans, were wanted. These necessitated the construction of a new bridge. At first a suspension of two spans 300 feet each, and two end spans of 180 each was intended. But doubts arose as to the rigidity and fitness of such a bridge, for the ever-increasing heavy travel and the plans were changed to a truss bridge. The design has been prepared by and the work placed in charge of Mr. Justin Lindenthal, an able and well-known bridge engineer. It provides for two main spans of 300 feet each over the navigable part of the river, and for seven spans of 40 to 85 feet each, about half of the number at either end of the bridge. The width of the bridge will be 48 feet including the two sidewalks, each 10 feet wide. The two large openings are to be spanned by lenticular trusses of graceful and commanding appearance, resembling together a figure eight (∞). Ornamental cast-iron towers will form the entrance to the bridge. The trusses are built of steel; the floor construction and wind-truss under the floor are of iron weight to the amount of 6,000 pounds per lineal foot and will strain the steel and iron only to the moderate limits now established for first-class iron steel bridges. The short spans are formed of heavy plate girders, six of which are in each span. They are entirely under the floor, so that the entrance view to the long spans will remain unobstructed. The floor itself will be of preserved gum-wood block pavement, put down in a very durable and substantial manner. The design of the hand-railing will be in harmony with the other work, which is to be first-class in every particular. The bridge is expected to be of such rigidity that teams may pass over it at any desired rate of speed without perceivable vibration in any part of the bridge. Another peculiar feature of building this bridge is that it is erected above the old bridge, on which travel continues all the time, and that it is intended to change the travel from the old to the new bridge without disturbing it for a single day. The work is progressing rapidly. At this writing one of the long spans is erected, together with some iron work, for the approaches. The new bridge will be completed and the old one taken down by the first of next April. This will be a great convenience to the South Side as it is an impossibility for any one to cross the bridge now without waiting for from fifteen minutes to half an hour. Another advantage is that street cars and carriages will be allowed to trot across the bridge thus saving a great amount of time, and having a liberty which is allowed on no other bridge in Pittsburgh.

CUSHIONED STEEL WHEEL.—The Boston *Commercial Bulletin* says: The Cooper cushioned steel wheel, manufactured by the Boston Standard Wheel Co., consists of a body of cast iron with a tire of steel shrunk upon it after the manner of all other steel wheels. Prepared rubber is forced between the body and rim, and then vulcanized, thus forming an elastic cushion between the steel and the iron, effectually preventing all jarring. One of the objects of the inventor in producing this wheel was to provide against crystalization which is now understood to be one of the principal causes of the severest accidents upon railways.

THE REVIEW is a scientific journal which mechanics cannot well do without.

THE TRADE REVIEW
AND
Western Machinist.

FIFTEENTH YEAR.

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ABOUT the first week in January the REVIEW will issue an enlarged number, of from 24 to 28 pages, as an index to the business enterprises of the extensive territory through which it circulates. An extra edition will be run off, and advertisers will thus be given the benefit of a wider circulation than usual and at no advance in rates. Advertisements should be sent in early to secure choice locations.

IRON AND STEEL.

There has been more alarm in the iron and steel trades than the position of affairs would seem to warrant. It is in the West that a general wail goes up, and this at the very time when Eastern mills are not only profitably running but for months to come will be behind orders. Our Western mills are in a better position than the Eastern to secure raw material, and should consequently be able to produce cheaper, whilst as to an excess of capacity relative to demand, all mills are subject to this disadvantage. The effect of a general falling off in orders, would, one might suppose, be so widely diffused, that though we might witness the business of certain works curtailed, these should not relapse into silence whilst the rest went on. We are well aware that a number of the steel works are temporarily unaffected, having contracts at $45 per ton running into next year, but what of others? The Scranton people are going on though getting only $40 per ton, and our Pittsburgh correspondent quotes an iron manufacturer to the effect that they will lose less at this figure than by stopping their works. In reference to the activity of Eastern mills, we would ask, whether certain St. Louis and Chicago managers have not been relying too much on continuous orders, whilst their Eastern competitors have been pushing business. A general falling off in orders for rails, some 11,000 miles being the estimated construction for this year, could not be maintained with any advantage either to the steel trade, or the country at large. A feverish speculative element in full activity could alone continue this rate of construction, launching us in a financial crisis. That curtailment is a security for the future, and should readily have been anticipated. The statements that have been published as the result of interviews with officials of St. Louis and Chicago mills that "intend" to close, appear to us rather in the light of feelers than announced decisions. The position of steel has been well described as an artificial one, and whilst all interests are in sympathy with it, it is evident that none can be permanently advantaged by an excess of production. Looking to the years of exceptional prosperity which the iron and steel men have enjoyed, and the duties they owe to the working organizations around them, we conceive that instead of showing the white feather, in shutting up their works because they cannot get their price, they should proceed even at what they may conceive, either wrongly or rightly, to be a present sacrifice, to make some effort to continue operations for the sake of their men. Capital has its duties. The opposite course will entail loss in the long run. To keep on, whilst watchful to secure every possible economy in processes of manufacture, would seem to be both the just and most prudent course.

There is one strong point in home iron, and this is that prices of British iron are not such as to encourage exportation to this country. The reliable firm of Messrs. E. L. Harper & Co., of Cincinnati, write us: "The close of the year will terminate many contracts which will require renewal. There can be no question that there is no superabundance of good foundry grades, and the opening of the new year, with its liberal requirements, will doubtless be accompanied with a fresh impetus to the interests of the iron manufacturers and consumers." Some of our best Cleveland iron men consider that there has been something of a scare, and that there will be a fair development of trade in the new year.

ECONOMY IN CONSUMPTION OF FUEL.

On the important topic of the economization of fuel we have received a pamphlet from W. H. Cory, of England, its author, and who has established himself in Philadelphia for the purpose of carrying out a process for the utilization of slack or coal dust, and the substance of which was lately presented by him to the Engineers' Club of Philadelphia. Mr. Cory has obtained patents for his process and press in nearly every coal-yielding country in the world, a fact showing his own confidence in its value, whilst most favorable reports of the process have been received from wherever it has been tested. The enormous accumulations of screenings in our older coal regions are almost a scandal to modern invention. Mr. Cory's process consists of first crushing the coal (when necessary) and mixing it with a very small percentage of fine ground fire-clay, and another small percentage of silicate of soda, in solution. These materials are thoroughly incorporated, and subjected to a pressure of one ton to the square inch of the block surface, the blocks are stacked to dry, and in twenty-four hours (the chemical action of the alumina in the clay having converted the silicate of soda into silicate of alumina, or into an insoluble substance in that time) the blocks are fit for use, and are as hard as ordinary coal. Among the advantages are the following: The fuel is generally better than lump coal, and will do at least seven per cent. more work, as in the case of fuel there is no loss from small particles being lost to combustion by falling through the bars, etc. The silicate being only a mixture of sand and soda-ash boiled together under steam pressure for three or four hours, it can be manufactured at the fuel works at little expense; and fire-clay can be obtained from wherever the coal is. The fuel, being compressed, only occupies 30 cubic feet in stowage per ton, coal taking 42 feet. The fuel does not smoke, smell or decrepitate in the furnace, is weather proof, does not cause clinkers (silicate of alumina only fusing at the very highest furnace heats), nor injure the fire-bars. The machinery (as the manufacture is continuous, only a small quantity of coal being under manipulation at a time) is light, automatic and inexpensive, and the press is constructed to manufacture 40 ten-pound blocks per minute, and the only apparatus needed for making the silicate is a steam boiler. Mr. Corry supplies a full set of machinery capable of manufacturiug 240 tons in 20 hours for $5,500, and guarantees it in every respect. He has now five sets of machinery in order, and many firms on the point of taking licenses. His royalty (inclusive of process and machinery) ranges from ten to twenty-five cents per ton according to district. The special action of clay on silicate has been long the subject of scientific investigation abroad, and the results thus independently reached confirms this view of the benefits derivable from the process. The economy of the process strongly recommends it. The actual cost of producing any considerable quantity of the Cory fuel, including skilled labor, is but 50 cents per ton. Although Mr. Cory only commenced the introduction of his process in the States last June, he has already received orders for the erection of several sets of fuel machinery from different parts of the country. We understand that among railway companies, the Northern Pacific is greatly interested in this invention, and is making arrangements for its adoption.

CURTAILMENT OF THE RUBBER INDUSTRY.

In the present month the india-rubber manufacturers reduce their production 25 per cent. in addition to the 25 per cent. reduction in November last, with the exception of the belting men, whose product is a necessity. The agreement come to in order to counteract the Para rubber men who had bought up a deficient crop, and of this shipped two-thirds instead of one-third, as usual, to England, is not unlikely to have its effect in lowering the cost, all which will be known by the 23rd inst. when, should the price of rubber not come down, the india-rubber manufacturers agree to shut down their works altogether. The reduction of the product 50 per cent. has thrown some 40,000 operatives out of employment, a matter to be deeply regretted. At the same time the price of the manufactured product has been advanced, as the result of decreased consumption being coincident with increased demand. The shipment to England of two-thirds of the supply of Para rubber was not made in any belief that the English market would consume it all, but that the English and German speculators concerned could obtain heavier advances on it there, and at the same time, by stinting the United States supply, make good here their increased charges. There are numerous branches of trade particularly dependent on india rubber which must be injuriously affected should prices not be put down, of which we entertain some question, as the speculators are likely to rely on the pressure of the outside public. The excessive charge made by the speculators for Para rubber is quite in accordance with the ethics of the stock exchange, but looking to the serious way in which manifold interests are affected by it, would appear morally unjustifiable.

WHETHER the "Wheeling Syndicate" succeed or not in demonstrating the practicability of making nails out of low-grade steel, they will be accorded their full meed of praise for undertaking a gigantic enterprise in a business-like way. Full particulars of their plans, with some fresh details, are given by a special correspondent of the TRADE REVIEW in the present issue. That the initial trial in the manufacture of steel nails should have been pronounced unsatisfactory need not necessarily argue the ultimate failure of the scheme, and the result will no doubt prove the wisdom of the projectors. An incidental and at the same time important feature of the promised "revolution" in the nail trade will be the remanding of puddling to the realm of tradition and the opening up of a new field for skilled labor—a state of things better for both capital and labor in all respects.

AN anomaly of the dullness in the steel rail in

dustry is the better feeling apparent in the general iron market. That active preparations are being made at Chattanooga, Tenn., for the early erection of a new iron furnace of large capacity does not argue very strongly on the side of the pessimistic view of the situation.

AN interesting interview is accorded a TRADE REVIEW representative in this issue relative to the "Basic Process" so-called, by its inventor, Mr. Jacob Reese, the well-known Pittsburgh metallurgist. The REVIEW is promised further valuable information from Mr. Reese.

"NEW Machinery" will hereafter be a department of the REVIEW, with illustrations as a special feature. Inventors and manufacturers are requested to notify the editor of anything novel and of general interest which comes under this head.

RAILROADS.

THE West Shore road has secured nearly all the right of way between Utica and Buffalo.

EIGHTY-ONE per cent. of the New York Central's earnings is said to be from local traffic.

IT is expected that the Northern Pacific will be completed to the Pacific ocean by next June.

THERE is much dissatisfaction among certain of the trunk line companies in regard to differential rates as they now exist.

RAILROAD building this year has converted $160,000,000 into fixed capital and brought over $300,000,000 in new securities upon the market.

THE opening of the Mexican Central Railroad to Guanajuato, which places a great mining region in communication with the capital, was celebrated yesterday.

THE cut on the Chicago, Milwaukee & St. Paul railroad, reducing tickets from eight dollars to fifty cents from Rock Island to Chicago, still continues.

THE Valley railway has made some changes in time on account of the extension of the road to Wheeling Junction, where it connects with the Wheeling & Lake Erie to Marietta.

THE N. Y., P. & O. R.R. will have its branch to Chicago ready for freight business by January 1st. This line runs from the main line to Marion, O., and is called the Chicago & Atlantic railroad, the permanent way of which is being rapidly proceeded with.

THE Toledo & Indianapolis railroad company has executed and recorded a mortgage on the first division of its road, from Toledo, O., to Findlay, to secure an issue of $800,000 bonds, the proceeds of which are to be used to complete and equip the road.

THE Columbus, Northwestern & Ft. Wayne company has filed articles of incorporation to build a railroad from a point in Van Wert county, O., west by north to Ft. Wayne, Ind., about 35 miles. It is apparently intended to be a branch of the Lake Erie & Western road.

THE New York, West Shore & Buffalo continues making purchases of land near Buffalo, and has two agents in the country acquiring the right of way. The contracts for building the road at this end are expected to be made in a day or two.

THERE is a prospect that the construction of the Mt. Vernon, Coshocton & Wheeling railroad will be shortly commenced. Liberal subscriptions have been made at Mt. Vernon and Massillon. The distance from Mt. Vernon to Wheeling will not vary much from 125 miles.

The Columbus & Fort Wayne Railway Company has been incorporated, capital stock $75,000, in shares of $100 each, by A. R. McKenzie, Jeremiah Arn, J. T. Burt, F. H Cooley, J. E. Clark, J. W. Ogden, B. F. Martz, and J. E. Williams. The principal offices will be in Urbana, Champaign county. This road will run from McConnellsville, Morgan county, through the counties of Perry, Hocking, Fairfield, Franklin, Madison, Champaign, Auglaize, Mercer, and Van Wert, to the State line between the States of Ohio and Indiana, to a junction with the Columbus, Northwestern & Fort Wayne Short Line Railroad.

THE WHEELING STEEL SYNDICATE.

HOW IT IS PROPOSED TO REVOLUTIONIZE THE NAIL TRADE BY USING LOW-GRADE STEEL.

Immense Bessemer Works Going Up at Wheeling With a Capacity of 120,000 Tons of Steel Per Annum.

SPECIAL CORRESPONDENCE OF THE TRADE REVIEW.

WHEELING, W. VA., Nov. 27.—The leading topic of conversation in iron and steel circles for the past week has been the "Wheeling Syndicate," who are to introduce the use of steel in place of iron in the manufacture of nails. On interviewing the leading stockholders, we learned that for a number of years past the manufacturers of iron nails have had under consideration the feasibility of the substitution of steel for iron in the making of their product, but they have never before been enabled to see the success assured of putting steel nails on the market at a price which would make them salable, and the reasons for this heretofore have been: 1st, they did not know how far the nail men would combine; 2nd, there are so many patents on every process of steel making that it would be very troublesome to make an attempt with almost any process; 3rd, they could not get steel soft enough and at the same time having the requisite qualities to make a good nail and do this at a reasonable cost.

The seven important nail manufacturers of Wheeling, the Benwood, La Belle, Tops, Riverside, Belmont, Wheeling and the Jefferson mills at Steubenville, decided some time since to thoroughly investigate the matter, and had a representative comm ttee appointed who, after deliberative experimenting for several weeks, reported back to the parties interested that the scheme was perfectly feasible and would have undoubted success. Acting upon this suggestion, on the 23rd of November these articles of incorporation were secured—each firm appointing a person to represent them in the company:

"The undersigned agree to become a corporation by the name of 'Wheeling Steel Company,' for the purpose of manufacturing and dealing in steel in all forms, and of manufacturing, mining, producing and dealing in any articles or materials used in the manufacture of iron and steel in any form; which corporation shall keep its principal office or place of business in the city of Wheeling, in the county of Ohio, State of West Virginia, and is to expire on the 22nd day of November, 1932. And for the purpose of forming this corporation we have subscribed the sum of $7,000 to the capital stock thereof, and have paid in said subscription the sum of $700, and desire the privilege of increasing the said capital, by the sale of additional shares of stock from time to time, to one million dollars in all. The capital so subscribed is divided into shares of $1,000 each, which are held by the undersigned respectively as follows: By J. N. Vance, residing at Wheeling, W. Va., one share; C. D. Hubbard, residing at Wheeling, W. Va., one share; L. S. Delaplain, residing at Wheeling, W. Va., one share; S. K. Wallace, residing at Wheeling, W. Va., one share; J. R. McCortney, residing at Wheeling, W. Va., one share; William H. Wallace, residing at Wheeling, W. Va., one share, and the capital to be hereafter sold is to be divided into shares of the like amount. Given under our hands this 23rd day of November, 1882.

J. N. VANCE, C. D. HUBBARD,
L. S. DELAPLAIN, A. W. KELLEY,
S. K. WALLACE, J. R. MCCORTNEY,
WILLIAM H. WALLACE.

The companies interested in the syndicate represent a combined capital stock of $4,500,000, consequently whatever they undertake will undoubtedly be fully developed.

The new steel mills will cost $1,000,000 and will employ 2,000 to 2,500 workmen. This is to be convenie tly located, but the exact site has not yet been determined. This immense steel plant will be furnished with pig iron by the seven blast furnaces belonging to the concern, which have a capacity of 150,000 tons of pig iron per annum, and the steel plant will turn out 120,000 tons of steel nail plate for the seven companies interested, and as there is a loss of 10 per cent. in the process from pig iron to steel and another 10 per cent. in the process of producing nails, the entire product of the "Syndicate" will be 100,000 tons of nails per annum. The steel plant will have three eight-ton converters with three large blowing engines, and supplied by five cupola furnaces and one blooming mill with 800-ton capacity. The pig iron is melted in the furnaces and then conveyed to the converters, where it becomes steel. It is then cast into molds, reheated and rolled into nail plates without having become cool after once it enters the melting furnace. Thus the cost of reheating is done away with. There will be fifteen heating furnaces.

The stock is to be owned exclusively by the parties mentioned, $493,000 is to be offered at first and the proportion that each will have is not yet decided, but it is impossible for any one except the seven Wheeling companies to obtain stock, as was evinced by a prominent Buffalo, N. Y., nail manufacturer, and jobbers' offers for stock being utterly refused. This substitution of steel for iron does not necessitate the slightest change in the machinery of the several mills, as has been determined by experience, but they will use exactly the same machines as hitherto, except that the forging departments of the mills will be dispensed with as such, yet they will be used as sheet mills. The steel mill will furnish the steel plate in the condition required to the seven nail manufactories at Wheeling. It seems to be the opinion, prevalent among iron and nail men, that the steel nail will be the first quality nail; that iron will be obliged to retire to a second rate grade and lower price, yet it will not be driven out of the market.

"Just look at that steel nail and compare it with this iron one," said one of the stockholders. "See how clean cut and smooth it is. Why that steel nail has all the advantage of a clinch nail, and can be driven into any wood. It combines strength with tenacity and is much lighter than the iron nail of the same effect, consequently there will be eight or ten more of them to the pound than to a pound of iron nails that would do the same work, and a builder uses just so many nails and if he can get more for a pound he is willing to pay more for them."

The syndicate are negotiating with Mr. Jacob Reese, of Pittsburgh, for the use of his basic process, and it is a possible thing that they will use it in making their steel. Wheeling has been the great nail center of the U. S, and its mills have been famous for their fine product, commanding a higher price in the market than many other nails. In this new venture they deserve great credit, as it will make a great revolution in the nail market. It is one step further in the substitution of steel for iron, wh ch some day in the future will be more general.

PROJECTED CANALS.—The constantly increasing use of steam to the supersession of sailing ships, says the London *Graphic*, renders canals of more practical importance than formerly. A sailing ship, unaided by a fair wind, would naturally make very slow progress along a narrow cut of water, whereas a steamer on account of the smoothness of the surface—shows to better advantage there than on the sea. Hence we have ambitious projects of ship canals in various quarters. France desires to islandize herself by cutting a broad, deep dyke from Bordeaux to the Mediterranean; Germany proposes a waterway from the Baltic to the North Sea, across Holstein, thus rendering herself independent of a possible Danish blockade of the Sound; Manchester plans to become a seaport, to bring the briny ocean close to Market street, and leave her old rival, Liverpool, stuck in the mud. This latter project is to be achieved either by a canal from the Mersey, or better still, by utilizing the neglected estuary of the Dee.

GUNPOWDER AS A MOTOR.—A patent has just been taken out in Germany for an engine, the piston of which is driven backward and forward by small charges of gunpowder supplied at each end by an automatic arrangement. The ignition is effected by the motion of the piston, which draws in a flame of gas or spirit, the access being regulated by side valves, which also open outlets for the escape of the gases of combustion.

THE first railway foreclosure sale of importance for a long time is that of the Marietta & Cincinnati road, which has been set for December 9. The sale will be only formal, as it has been arranged that the road is to be bought by a purchasing committee representing the bond-holders, who will organize a new company. It owns 275 miles, besides 36 miles of leased lines, and has long been operated in connection with the Baltimore & Ohio, which will doubtless still retain its control.

PRACTICAL MECHANICS.

MOLDING.

The art of founding consists in forming molds of materials capable of resisting heat, and afterwards filling these molds with melted metal. Molds are made of many different materials, and may be filled with various metals. Where the the work is in iron the molds are made, usually, either in iron or in some sandy or earthy substance, of which there are two principal kinds, the one usually employed in small and simple work, being green sand molding. In green sand work there is usually a pattern employed of nearly the size and shape, in its principal dimensions and outlines, of the piece which is to be made. This pattern is formed to "draw;" that is, it is so shaped that all of its parts diminish from one side to the other, so that if the larger side is laid upon a board, termed a "follow-board," and a box with neither top nor bottom is placed upon the follow-board and filled with sand, and then turned over so as to expose the larger size of the pattern, the pattern may be withdrawn from the sand, leaving the exact reverse of its shape in the sand which is confined and supported by the sides of the box.

The complication of patterns often necessitates a division of the pattern into two or more parts. This is very often done, and the mold is also divided by making the boxes, called "flasks" which hold the sand, in separate parts, which are held accurately in relative position by pins on a flask fitting into holes in ears upon the flasks next to it. In this way, two, three, four, or more flasks are held together during the process of filling, or "ramming up," with sand. In many cases the pattern is embedded in the sand which forms the floor of the foundry, the sand being "tucked in" about the pattern with the hand, and the pattern "driven down," to secure an even bearing, with a light hammer and block of wood. In some cases the pattern is simply withdrawn, and the melted iron poured into the open top of the mold. In most cases the top of the mold is covered by a flask which is called the "cope," and a hole is made in the cope through which the metal is poured. When two flasks are used the upper one is called the "cope," and the lower one is called the "nowel." It often occurs, however, that simply dividing the flasks at various points in its height does not permit the release of the pattern; in these cases there are longitudinal vertical divisions of the mold and flasks which enable parts of the mold to be slid out sidewise. These side-moving parts are termed "cheeks." Flasks are also often divided in waved, offset, or curved lines, to suit the divisions needful in the pattern to permit it to be withdrawn from the sand. The sand with which the flask is filled is made damp with water, so that it will have a degree of coherence, and hence founding done in flasks is called "green" sand work. The presence of water causes great volumes of steam to be given off when the melted metal is poured into the molds, and as this vapor may find a lodgment in some of the cavities of the mold, it often causes imperfect work by resisting the entrance of the metal, or by becoming surrounded with a film of the metal,and making a mere shell where there should be solid iron. The mold formed of green sand is also a very delicate structure, a strong puff of air from the hand bellows or the lungs will often dislodge a portion of it, and the act of closing the various parts of the mold together may break down part of it, and thus spoil the work. To avoid these troubles, the mold made in flasks as described is often dried by being placed in an oven and exposed to heat until the moisture is all evaporated. This is called "dry sand" work, and is much more likely to produce good work when the casting is of an intricate form.

When there are holes to be made in the work, what are called "cores" are used. These are bodies of sand, either green or dry, often having metal rods or tubes through them, which are formed separately from the mold, and are put in proper position when the flasks are finally closed together, being supported in seats in the sand formed by projections on the pattern, called "core prints." When the cores are to be dried, which is the usual case, they are mixed of sand, with a little flour; resin, beer and molasses are also employed to mix with the sand for cores which are to be dried. Green sand work is sometimes made partly with "sweeps." A "sweep" is, in general terms, a flat piece of wood or metal which is guided in its motion by either a center about which it revolves, or by fixed guides in a straight or curved line, the sweep having a part of its outline corresponding to the sectional outline of a part of the work. Thus it is easy to see that a fly wheel might have its rim swept up by a sweep which had corresponding section, and was constrained to move in the circle desired, and also that the sweep would be much cheaper to make than a wooden pattern for the entire run of the wheel. So far the arms of a fly-wheel a sweep may be employed, even where the arms are tapering.

In green sand molding the pattern is always expensive. It must be durable. It must be as light as possible. It must be very strong and resist moisture, and very smooth, so that it will leave the sand readily, and above all, it must have an exact relation to the size of the piece to be produced. The pattern is not the size of the work; it is usually larger in all its dimensions as melted iron shrinks nearly one-eighth of an inch to every foot in cooling. Great care and accuracy are required in pattern making, and great care and a great deal of room are required to store and preserve patterns while they are not in use. The pattern is made by pattern makers, who are very accurate and careful workmen and used by molders, who are also accurate and careful in their way, but often injure patterns more than is needful, and thus the pattern becomes a constant source of trouble.

The flasks are also troublesome. When they are large, if made of wood, they are weak,and as the melted iron exerts a great pressure outward, the casting is often "strained," or larger in the dimensions which were low in the mold and subjected to the pressure of the melted metal. If the flasks are made of iron they are expensive, and whatever their material they are always bulky, and as only a small part of those owned by any one foundry are commonly in use at the same time, the room they occupy in storage is often sorely needed for other purposes. It is mainly in large and complicated work that these difficulties, due to the existence of the pattern and flask, are experienced, and in certain classes of large work they become so annoying and expensive that it is expedient to dispense with both, and to have the molder take the drawings and decide upon the needed "sweeps," and to make his work without flasks. This method is termed "loam molding." The sand used is called "fire-sand," and is much more difficult of fusion and much coarser than that employed in green sand work; it is not made merely damp, it is mixed with water and clay-wash to a thick yellow mortar, and is used with the hand or a trowel while the mold is in course of making. After the mold is made and sufficiently dried in the air or by the application of local heat from wire braziers, filled with burning coke or charcoal, it is removed bodily to an oven and there dried perfectly.

INDUSTRIAL SCIENCE.

BOILER BRACES.

The large number of broken and loose braces which we find every month is a pretty sure indication that there is abundant room for improvement in workmanship on the part of some boiler-makers. If a brace is properly made and attached to a boiler, there is no more reason why it should ever break or get loose than there is for a plate in the shell to become loose and fall into the furnace. But they do break, and get so loose that they might as well be broken. The ways in which braces fail are various, and depend upon the construction of the brace itself, as much as anything else. One of the commonest faults to be met with, is a deficiency in the size of the eye, where the brace is attached to angle or T irons. We have actually seen braces an inch in diameter, with the eye or part not over one-half an inch square, and this merely bent so as to form a hook instead of being bent around and welded as it should have been. As might be expected under the circumstances, the hook was well straightened out and the head of the boiler badly bulged. One of the best forms of brace is made by welding a crow-foot to the end of the brace which is attached to the tube sheet, and riveting the whole thing rigidly to shell and head. If one could be sure that the weld were always sound, this would be a first-class brace for parts of a boiler that are exposed to the fire; but unfortunately this is not the case. All experiments that have been made show that the strength of a welded joint is a very uncertain thing, and cannot be depended upon to be much more than one-half the strength of the solid part of the bar. A very common way of attaching braces is to rivet two angle irons to the tube sheet, make the brace with a single eye, and fasten with a pin. The objection to this method is that the angle irons cover too much of the plate, and the space between them forms a lodging-place for sediment, which is apt to give trouble if it is used on surfaces exposed to the fire. In addition to this, the claw-hammer strain on the heads of the rivets in the angle irons is apt to loosen it so that the braces become slack. The best method of connecting braces is to rivet T irons to the tube sheet and attach the brace by a pin and double eye, taking care to make the double eye of such a size that its strength shall be at least equal to the body of the brace. The T irons should be riveted radially to tube sheet, and the braces also arranged radially. In this manner all oblique strains are avoided, as well also all twisting of the brace to make the attachment to the shell. For surfaces exposed to the direct action of the fire, however, the plain crow-foot brace is to be preferred. The model brace for all parts of a boiler will not probably be designed until we can obtain mild steel castings which can be depended upon every time. Then a simple crow-foot with a double eye may be cast, and the body of the brace made simply of a flat piece of iron with a hole drilled near the end, and fastened to the crow-foot with a straight pin. This would seem to be the most simple and reliable form of brace that could be desired.

MECHANICAL RECEIPTS AND ITEMS.

Making Incrusted Bronzes.

Bronzes incrusees is the name given to a Parisian novelty in bronze or copper work, with gold or silver decorations. The decorations are painted upon the objects of bronze or copper in water colors containing lead white in large quantities. If many objects are to receive the same pattern, they are printed in the manner of porcelain ware. The article is then placed in diluted sulphuric acid, which dissolves the color and etches the metal to the necessary depth. After washing, the article is placed in a silver or gold bath, and the metal deposited on the etched surfaces by means of a battery. The varnish is now removed and the whole surface ground, so that the metal shall in no place protrude. The whole can then be bronzed without affecting the gold or silver decoration. A fine effect is said to be produced by depositing black bronze (cuprous sulphide) between the gold and silver.

Staining Sheet Zinc.

Among recent German inventions is a simple process, depending on the use of acetate of lead, by which every kind of color is applicable to sheets of zinc. By mixing black lead for instance, with the salt, a very agreeable light brown hue is obtained. It is by this process the cupola of the synagogue at Nuremberg has been painted. A sufficient length of time has already elapsed, it is said, to show that the atmosphere has no influence on the zinc sheeting of the roof, thus showing the practical value of the process in such cases. By the addition of other coloring matters, light or dark shades of yellow or gray may be produced.

Welding Metals.

In the process here described the fluxing material is first mixed with filings of the metal to be welded. Afterwards the mixture is agglomerated under pressure into sheets, and is then ready for being placed between the two pieces of metal to be joined, the latter being heated to the required degree and subjected to the necessary hammering or pressure for welding. When large surfaces have to be united the inventor recommends the use of sheets of paper or other suitable substance saturated with the fluxing material, for which it serves as a temporary support. These saturated sheets are first passed between rollers and having been dusted over with the metal filings, are placed in a muffle, after which they are again passed between equalizing rollers in order to prepare them for use.

Waterproof Leather.

For the preparation of impermeable leather, a coating composed of a litre of linseed oil, 125 grains of tallow, 46 grains of wax, and 32 grains of resin, melted together, is applied while yet warm to the surface of the leather. The fishermen of England have for a long time employed a coating of linseed oil and tallow for rendering their boots waterproof. The addition of resin and wax improves the efficacy of the coating.

SCIENCE AND INVENTION.

CUTTING SHAFTS OR BARS OF METAL, ETC.—The invention of Mr. William Cook, of Glasgow, which received provisional protection only, relates to new or improved apparatus for cutting shafts or bars of metal, is also specifically adapted for cutting off the ends of such objects as boiler stays, studs, or bolts, after the same have been fixed and tightened in position. Under the first head the invention consists of a ring which is fixed by set screws or by an equivalent gripping arrangement on to the shaft, bar, bolt, stud, or nut, from which a part is to be cut off. Upon the aforesaid ring another and larger ring is mounted so that it may be rotated thereon. In this ring a cutter is fitted by passing in through one side thereof, the said cutter being provided with a screw, wedge or spring, for forcing it inwards or drawing it outwards. The apparatus is further provided with handles for rotating it round the shaft, bar, rod, or other object, which it is used to cut. In the act of cutting, the cutter itself is gradually forced inwards by the screw, wedge, or spring, until severance of the object being cut is effected. Under the second head the invention consists of a segmental saw cutter mounted on the short end of a lever, and at right angles to the length thereof. This lever is mounted on a stud carried by a bracket, which when in use may be attached to the object requiring to be cut or to a fixture in the neighborhood of that object. The stud on which the lever and saw are carried is fitted with a screw and hand wheel for drawing the saw to and from the object to be cut and for pressing it against the same during the cutting action. When the saw is adjusted to the required position, it is operated backwards and forwards by a workman acting upon the long end of the lever. Under the third head the invention consists of a bracket attached by set screws to the object to be cut. On this bracket a lever is mounted which carries a short straight saw attached by an adjustable pin to that part of the lever near the said bracket. A powerful spring is also attached to the lever, and this pressing upon the back of the saw forces its cuting teeth against or into the object to be cut. The said apparatus may be fitted so as to be rotated or reciprocated as desired.

TOOLS FOR CUTTING OR FINISHING BOILER STAYS.—The object of the invention of Mr. Robert Davidson, of Glasgow, which received provisional protection only, is to facilitate the operation, and reduce the labor and time required for cutting or finishing boiler stays, by providing an improved kind of tool for the purpose. In carrying out the invention a small frame is constructed with one or more screws for adjusting and fixing it in position upon or in connection with the stay, and this frame is fitted with a movable tool or tool-holder which by means of one or more lever arms can be moved with a reciprocating or continuous rotary motion, so as to cut into the redundant or projecting part of the stay. The projecting part of the stay may be completely severed or it may be so far cut into as to admit of its being easily broken off with a hammer. The improved tool is more especially designed for stays formed with projecting squared ends by means of which they are screwed into the boiler, and in some modifications the small frame is arranged to be adjusted and temporarily fixed on the nut of a stay. In one modification the movable part is arranged to carry a cutter round the stay, the cutter being fitted in a V shaped or other guide in the movable part, and having in connection with it a screw by means of which it is fed inwards as the cutting progresses. In another modification a rotating or reciprocating saw-like cutter is fitted on a centre pin on a small frame, so as to act on one side of the stay, and a screw fitted to the other side or end of the frame serves for feeding in the cutter as the action progresses, by drawing the frame in a suitable direction.

CORES FOR USE IN CASTING STEEL TUBES, &C.—The object of the invention of Mr. Benjamin Johnson, jun., of Pudsey, near Leeds, England, is to provide a core so constructed that a true negative thereof can be produced in the form of a tube, ingot, or other article without injury to the main body of the said core, and so as to leave the interior surface of the casting smooth, true, unhardened, and without cracks or honeycombing. For that purpose he constructs a core, which he calls a duplex core of an inner tube or piece, and an outer sheath or case. The inner tube or piece, which is made of metal, acts as a tray or support to the outer sheath or case, and is collapsible or yielding. The outer sheath or case is made of thin metal (clean or bright externally), and surrounds and is in contact with the inner tube or piece, The duplex core is secured in the desired position in the mold by means of guides, sockets, or holding pieces. The molten steel is poured into the mold and flows around and in contact with the outer sheath or case, the inner tube or piece is removed and used in combination with another outer sheath or case for a second casting, and so on. In practice the inner tubes or pieces and the outer sheaths or cases are conveniently and advantageously made of sheet metal bent into the desired form.

A NEW STEAM ENGINE.—A cylindrical enlargement is formed between the high and low-pressure pistons in a vertical inverted compound tandem steam engine, the low-pressure cylinder being placed above the high-pressure cylinder. The cylindrical enlargement excludes steam from a part of the area of the upper face of the high-pressure piston, and there will be a greater pressure during the up stroke which may balance the weights of the pistons, piston-rod, connecting rod, and crank. The exit of the exhaust steam from the cylinder to the condenser is regulated by a multiported valve, either self-acting or mechanically actuated.

GATE AND NOZZLE FOR WATER WHEELS.—Samuel N. Knight, Sutter Creek, Cal., has invented a gate and nozzle for water wheels. In a nozzle consisting of independent passages for the discharge of water under pressure upon a wheel rotating in a vertical plane, the gate has ports by which one, two or more of the passages may be opened or closed in combination with a piston moving within a cylinder and connected with the gate by its piston rod, so that a pressure of water admitted to either side of the piston will move the gate across the water passages.

LIGHT QUARTZ MILL.—A very neat invention has just been brought out in the West, in the shape of a light quartz mill, in which a light stamp is made to do the work of a heavy one. This is accomplished by means of what might be termed a reversed atmospheric dash-pot. The stamp, when being raised, lifts a piston against atmospheric pressure, and of course when released the weight of the atmosphere is added to the weight of the stamp head in the downward stroke. The mill with two stamps weighs, when ready for shipping, only 2,000 pounds, and it is said that the blow equals that of a 500-pound stamp.

VALVE GEAR—Rudolph M. Hunter, Philadelphia, has invented a valve gear for steam engines which consists of two separated spur wheels of equal diameter, one of which is secured to the engine crank shaft, and the other supported upon a stationary axis in combination with two intermediate spur wheels hung from the respective shaft of the spur wheels of equal diameter, meshing with each other and respectively with said spur wheels of equal diameter, and about which they are adapted to move, and mechanism to move said intermediate wheels and hold them in two or more positions.

CORRESPONDENCE.

BEAVER FALLS, PA.—Our correspondent at Beaver Falls writes: The Beaver Wire Co., (limited), which was incorporated in October last, with a capital stock of $200,000, are rapidly completing their works. Mr. H. W. Hartman, formerly assistant general superintendent of the Gautier Barb Wire Works, of Jonstown, Pa., is chairman of the corporation and general manager of the works. Mr. H. I. Reeves, of the Economite Co., who controls the entire water power of Beaver Falls, is secretary. The stockholders comprise some of the largest barbed wire consumers in the west; also the Johnstown Wire Co., of Johnstown, Pa. The buildings are very extensive and are rapidly nearing completion; they are located on the marginal railroad which gives them fine connections with the Lake Erie and Pennsylvania systems. Their fuel is mined upon the same lot as their buildings. Their water power is exceptional, and the Economite company who control the water power of Beaver Falls expect to build two or three new dams which will greatly strengthen the force of the current. The company expect to put in their works one of the most complete wire plants in the country.

MECHANICAL RECEIPTS.

Alloys.

In making alloys, especially where the component metals vary greatly in fusibility and volatility, the following rules must be observed: 1. Melt the least fusible, oxidable and volatile first, and then add the others heated to their point of fusion or near it. Thus if we desire to make an alloy of exactly one part copper and three zinc, it will be impossible to do so by putting these proportions of the metals in a crucible and exposing the whole to heat. Much of the zinc would fly off in vapor before the copper was melted. First melt the copper and add the zinc which has been melted in another crucible. The zinc should be in excess, as some of it will be lost anyway. 2. Some alloys, as copper and zinc, copper and arsenic, may be formed by exposing heated plates of the least fusible metal to the vapor of the other. In making brass in the large way, thin plates of copper are dissolved as it were in melted zinc until the proper proportions have been obtained. 3. The surface of all oxidable metals should be covered with some protecting agent, as tallow for very fusible ones; resin for lead and tin; charcoal for zinc, copper, etc. 4. Stir the metal before casting, and, if possible, when casting, with a whitewood stick; this is much better for the purpose than an iron rod. 5. If possible, add a small portion of old alloy to the new one. If the alloy is required to make sharp castings, and strength is not a very great object, the proportion of old alloy to the new should be increased. In all cases a new or thoroughly well cleaned crucible should be used.

Alloy for Uniting Iron, Steel and Brass.

The following composition may be cast on steel or iron, and will adhere firmly thereto. Its rate of expansion is nearer that of iron and steel than any similar compound. When cast around iron or steel therefore, it closes firmly around them and does not become loose by alternate expansion and contraction. It consists of tin, 3; copper, 39½; zinc, 9½. Since the last metal is partly converted into vapor at a high temperature, the above proportion may be slightly increased.

FOREIGN CORRESPONDENCE.

ENGLAND.

BIRMINGHAM, November 17.

I have to note an improvement in the tone of the market for manufactured iron this week, and more orders have been given out. The weakness of the markets for Scotch and Cleveland pig iron causes some little uneasiness, but the raw material produced in other districts continues firm. The Board of Trade returns for October, so far as they relate to the iron and steel trades, are very satisfactory. The exports of iron and steel in 1882 will far surpass, both in quantity and value, the export of any preceding year. The Glasgow market has been flat this week, and warrants have changed hands down to 49s. 5½d. The market closes this evening at 49s. 11d.—5d. higher. The Middlesborough market has been quiet; and although shipments are keeping up, fears are entertained that the low price of Scotch warrants will interfere with the shipments of Cleveland pig iron to Scotland. No. 3 iron is offering at 44s. to 44s. 6d. Hematite iron is steady, stocks are being kept under on the West Coast, and makers are rejecting offers for future delivery except at late prices. Warrants f.o.b. Workington are offering at 57s.

The steel plate mills are well employed. In all departments of the steel trade there is no lack of orders, although prices are anything but satisfactory.

As to tin, the principal operators are still doing their utmost to work prices down, and selling for forward delivery in large quantities. Cash parcels are not so freely offered, and are comparatively dearer in price, thus showing the speculative condition of the market. The closing prices are £98 for cash, and £99 for three months forward. The tin plate market is depressed, idle works are being re-started, and the probable increase in production weakens prices. It would appear, however, as if present rates were not wholly unremunerative, if one may judge from the reports of fresh mills being about to start.

THE Roumelia Railroad has carried this year thousands of tons of tons of otto of roses.

The Welland Canal is closed for the season.

ITEMS OF INTEREST.

AUSTRIA is to have an electric railroad.

THE fires have been lighted at the Youngstown, O., Steel Works.

THE N. Y., P. O. is building a mail and express room at the new Cleveland depot near the Viaduct.

CALIFORNIA red-wood is largely in demand by our furniture dealers, and is becoming the most popular ornamental wood in the market.

THE operator, commenting on the fact that Morse and Bell both had deaf-mute wives, quotes, "See what a man can do when everything is quiet."

ACCORDING to a recent statement, the gross amount of wages paid to silk operatives in the whole country is $9,000,000 per annum, and the total value of annual product is about $35,000,000.

PEARL fishing is pursued by 1,000 divers on the coast of lower California. The pearl oysters are found from one to six miles from shore, in water from one to twenty fathoms deep. The yearly product is about $500,000.

A DRAWING-ROOM car for the transportation of live fish is certainly a novelty in the rolling-stock line, yet such a car arrived at the New York & New England Railroad depot yesterday morning.

AN artesian well to the depth of 500 feet has just been completed at Mt. Vernon, West Chester county, with the result of a production of 75,000 to 80,000 gallons every twenty-four hours of the very best quality of water.

THE war between the Boston, Revere Beach & Lynn and the Eastern railroad companies on passenger rates continues without change. Both companies maintain the 5-cent rate between Boston and Lynn, and are carrying very large numbers of passengers, and both profess to be satisfied with the result.

LEADVILLE, during the past five years, has produced 28,000,000 ounces of silver, 140,000 tons of lead, and 26,000 ounces of gold, exclusive of 100,000 tons of ore shipped to other towns for treatment. It will pay this year to the railroad companies $1,000,000 for the transportation of bullion to the Eastern markets.

THE new building put up this fall by the Arnold print-works at Adams, Mass., is to be a dye-house to color indigo-blue. One department has thirty vats and another twenty cylindrical mills to grind the indigo, which is imported direct from Calcutta. The value of the cloth thus treated is increased four cents a yard in the market, and the works will have a capacity of 35,000 pieces a week. About 120 men will be employed, who will come from England. The second floor is the drying-room.—*Boston Mfrs. Gazette.*

A SATISFACTORY experiment of making gas from petroleum was made at the Frankford arsenal, Philadelphia, recently. The gas is made by the system owned by the Smith & Gold thorp Gas Works Company of Pitts burgh. The oil passes from a reservoir through leaden pipes into a retort, which is inclosed by a furnace capable of subjecting the fluid to 1,000 degrees heat. It speedily evaporates, and the gas given off is conducted by coils of leaden pipes through two boxes of cold water, and thence into a retort when it is ready for illuminating purposes. The light displayed at night appeared much brighter than the city gas. It is said that it costs 75 per cent. less to manufacture this gas than the coal gas. Last year the gas bills at the arsenal aggregated $1,200. It is now proposed to furnish as much light for the same period for $300.

IMPORTS OF IRON.—Anent the depression in the iron business, in addition to the home manufacturers of iron, the importations have been very heavy, and now help to add to the depression. For the first eight months of the present year the importations of pig iron were 80,000,000 pounds more than during the corresponding period of last year. For the same period of time the importations of bar iron increased from 37,500,000 to 111,500,000 pounds. The increase in band, hoop and scroll iron was from 297,000 to 6,795,468 pounds; in sheet iron from 4,912,581 to 13,504,902 pounds, and in castings there was the enormous increase of from 300,000 pounds imported up to August 31,1881, to 3,309,611 pounds imported during the present year, or an increase of 1,000 per cent.

FISHERIES.—There are 16,017 persons engaged in the fishing industry in the Middle States, of whom 13,482 are fishermen. The greater part are native Americans and have families dependent upon them, so that the whole number largely dependent upon the fisheries for a livelihood is 62,000. The value of their product in the census year was $1,874,899, and the pounds of fresh fish sold for food were 55,277,777; and the whole number of pounds of fishery products were 412,525,862. Pennsylvania has 552 persons in the fishery business. The pounds of river products were 1,080,000, and of lake products 1,253,000. The total value of Pennsylvania fishery products in 1880 was $320,000. The total value of Delaware's fishery products was $997,695, and of New Jersey's $3,176,589.

DR. SIEMEN'S FALLACY.—That portion of the address of Dr. Siemens before the British Association which relates to the substitution of gas engines for steam engines is very interesting reading, but unfortunately only one side of the question is stated, and that but imperfectly. We have no space for extended comments, so we will call attention to but one point. The learned doctor says that the efficiency of any heat engine depends upon the range of temperature through which it works. This is true. But the range of temperature through which the steam or any other heat engine works, is, in practice, limited by, and only by, the materials of which the engine is made, therefore it is difficult to see how gas can have any advantage over steam. Admit, however, for the sake of argument, that the efficiency of the gas engine is double that of the steam engine; that is, the steam engine converts into useful work one-eighth of the heat due to the combustion of the coal in the boiler furnace, while the gas engine converts into useful work one-fourth of the heat due to the combustion of the gas used. Then we must bear in mind that this gas is only to be obtained from coal, and from three to four pounds of coal are necessary to the production of one pound of gas. The argument that the by-products of gas manufacture are worth more than the value of the coal used has very little weight, for in the majority of places where steam is used they would be worthless.

FOREIGN PETROLEUM.—The total area of the Baku petroleum region on the Caspian sea is some 12,000 square miles. The lands have been partly sold and partly leased by the Crown. The total quantity produced from this region in 1873 was 500,000 barrels, and in 1881 this rose to between 3,000,000 and 4,000,000, besides immense quantities of crude petroleum, which were wasted at the place of production from inadequate means of tankage and transportation. The export of the different petroleum products from Baku by sea amounted to 2,946,000 barrels in 1881, against 1,702,200 in 1879. A project is on foot for connecting Baku Batoum by pipes, thence discharging into tank ships on the Black sea, and so avoiding transport by railway

CANAL AND LAKE AND OCEAN RATES.—Canal rates have fallen notwithstanding the near approach of the close of navigation. For nearly a week the rates have been 3¾ cents a bushel for oats, 5¼ for corn and 5¾ for wheat from Buffalo to New York. Shipments made hereafter may not get though to tide water, but they have not ceased yet. Lake rates remain unchanged at 3 cents a bushel for corn and 3¼ for wheat from Chicago or Milwaukee to Buffalo, with a pretty good demand for vessels, though not nearly equal to what it has usually been at this season, as may be known by the rates, which usually advance sharply in November. Ocean rates have advanced, 5¼d. to 5½d. per bushel for grain by steam to Liverpool. Lake rates have been steady for 3 cents a bushel for corn and 3¼ for wheat from Chicago and Milwaukee to Buffalo, with very light shipments.

IT is noticeable that after the announcement of an advance in the rail rate to be made on the first of December amounting to 3 cents a bushel on wheat there was no pressure to ship by the cheap lake route and no advance in lake rates. The announcement, however, only made certain what the shippers had all the time expected and calculated for.

MARKETS.

Office of TRADE REVIEW AND WESTERN MACHINIST.

FRIDAY EVENING, December 1.

FINANCIAL.

The aggregate business in the money market has been light. Some currency has been received from the country. The market is strong at 7@8 per cent.; the rate is 6 per cent. on call and 5 per cent. on time on collaterals. Eastern exchange is quiet and steady. Foreign exchange is in fair demand. Government bonds easier. Local securities are steady.

IRON.

There is no alteration in the position of iron. Any extreme depression is very generally regarded as only likely to be temporary. Inquiries for good-sized lots of mill irons have been made during the week, and the best brands are firmly held at $22 at furnace, but others are weak and irregular, selling at all sorts of prices, from $20.50 upward. No. 2 foundry is a shade easier. There is considerable activity among makers of bar iron; the market is irregular, with 2 5c as a minimum. There is a good demand for structural iron. Steel rails are quiet; for small lots the price is $45 Orders for steel crup ends have been placed at $23.50. Merchant steel mills appear to be pretty well employed, although few, if any, are working up to their full capacity. Scrap iron is in fair request at our quoted prices. For tank and sheet iron there continues good demand.

CINCINNATI.—Reported by Rogers, Brown & Co. --The market is without essential change. The business of the week has been confined to carload orders for immediate delivery and a few large contracts for delivery next year. Most buyers are afraid to supply more than their every day wants on account of the Bessemer Steel agitation in the newspapers. A few large ones, however, reason that with prices down to about the average cost of production, taking the country together and with aggregate consumption running in excess of aggregate production, contracts closed now for six or twelve months delivery are wisely made. The talk at the Bessemer steel centers is thought here to be for effect upon the incoming Congress and upon labor. Mills in this district are filled with orders at paying prices, and the same is substantially true of Pittsburgh, though expectations at that center have not been realized. Car wheel iron is moving more freely but at low prices. Hot blast charcoal brands are a shade lower. We quote for cash Hot Blast Foundry. —Hanging Rock, C. C., No. 1, $25.00 @ $26.00; Hanging Rock, C.C., No. 2, $23.00@$24.00; Southern No. 1, $24.00@$25.00; Strong Coke No. 1, $22.50@$23.50; Strong Coke No. 2, $22.00@$22.50; Strong Coke No. 3, $21.00@$21.50; Soft Stone Coal No. 1, $22.00@22.50; Soft Stone Coal No. 2, $21.00@$21.50; Forge—Strong Neutral No. 1 Mill, $21.00@$21.50; Cold Short No. 1 Mill, $19.50@$20.50. Car Wheel and Malleable — Hanging Rock C. B., $31@$33; Hanging Rock W. B., $25@$27; Southern Car Wheel Iron, $29@$31; Lake Superior Car Wheel Iron, $27@$30; Lake Superior Malleable, $27@30.

CINCINNATI—Reported by E. L. Harper & Co. --The market has been fairly active during the week, though some sales of round lots have been made at lower figures than would have been considered by the furnaces a fortnight ago. The depression in prices is attributable largely to a scare produced by the contest going on among the steel rail manufacturers, which interest in reality has not the intimate relations with Pig Iron to produce a relative influence upon the iron business. We quote for four months: Foundry--Hanging Rock Charcoal, No. 1, $25.75 @ 26.50; Strong Neutral Coke, No. 1, $23.00@23.50; American Scotch, No. 1, $21.00@22.00. Grey Forge.—Neutral Coke, $21.50@22.00; Cold Short, $20@20.50 Car Wheel and Malleable —Hanging Rock, C.B., $33.00@35.00; Hanging Rock, Warm Blast, $27@28 Lake Superior 1 and 2 $27@28; Lake Superior, 3 to 6, $28@30; Southern Car Wheel, $32@33.

HARDWARE.

There is a fair trade for nails at unchanged prices. There have been considerable sales of cutlery. The cold weather causes skates to go off briskly. Trade in seasonable articles is active. Cutlery, locks, and general builders' hardware are in good request. Spades and shovels meet with a ready sale. There is quite a run on ice picks, hatchets, stove plate crimpers, adz-eye hammers and carpenter hatchets. The inquiry for all descriptions of plumbers' goods is active. A large trade is being done in wire cloth. The demand for foreign hardware in articles suited to current requirement has been fully maintained.

LEAD.

The weakness in the market continues. We quote 4¼ for car-load lots. Manufactured lead is unchanged and prices are as follows: Bar 6½c; pipe, 7½c; sheet, 8c; tinned lined pipe. 15c; tin pipe, 45c. All less 10 per cent.

COPPER.

There have been moderate transactions, sales being made at 18@18¼c. for Lake, and 17½c. for Baltimore and Arizona. The combination prices of manufactured copper are unchanged. We quote: Sheathing, 28c; Braziers', 30@32c; Bolt, 30c; copper bottoms, 31@32c; American yellow sheathing metal, 20c; y. m. bolt, 22c; English yellow sheathing metal, 16c. in bond.

TIN AND TIN PLATES.

There have been but moderate transactions in tin; sales have been made at 23¼c. and upwards. For tin plates the market is easier, and quotations could be shaded.

LUMBER.

PLANK, MIXED WIDTHS.
2 inch, 12, 14 and 16 feet, together.

A 1 and 2 uppers	$50
A 3	40
B	32
C	20
D	14
E	12

1¼ and 1½ inch.

A 1 and 2 uppers	$48
A 3	40
B select	32
C	20
D	15
E	13

BOARDS.
One Inch, mixed widths.

A 1 and 2 uppers	$44
A 3	36
B select	30
C	19
D	14
E	12

STOCK BOARDS.
12 Inches wide.

A 1 and 2 uppers	$45
A 3	38
B	32
C	21
D	16
E	13

STRIPS.
6 Inches wide.

A 1, 2,	$42
B	33
C	22
D	16
E	12
Norway Fencing Strips	17
Norway Flooring Strips	25

WORKED LUMBER
FLOORING.

Flooring—A 3	$42
B	35
C	24
D	20
Norway Flooring—A 3	26
C	22
D	18
Matched Drop Siding, 6 inches—A 3	42
B	38
C	24
D	20
Beaded Ceiling $2 higher than Flooring.	
One half inch Bevel Siding—A 1 and 2	24
A 3	20
B	18
Ash Flooring—A 1 and 2	40

BILL STUFF.

Small, joists, 12, 14 and 16 feet	$14
Timber, longer than 20 feet and over 44 00@$6 00 less than length.	
Cedar Posts, large	30 00
" " medium	25 00
" " small	$15 to 20 00

SHINGLES, LATH AND MILL WORK

Shingles XXX	$ 4 25
Clear Butts	3 25
Lath	2 75@3 00

Surfacing, one side, adds $1.25; two sides $1.50
Matching, flooring and drop sidings, $2.25.

LAKE FREIGHTS.

COAL.

Buffalo to Chicago	$1.25
Toledo to Chicago	1.25
Cleveland to Chicago	1.30
Erie to Chicago	1.15
Buffalo to Millwaukee	1.25
Cleveland to Milwaukee	1.20
Erie to Milwaukee	1.15

IRON ORE.

Marquette to Lake Erie ports	1.90
Escanaba to Lake Erie ports	1.40

To Speculators: A Grand Bargain.

A LARGE & FULLY-EQUIPPED MACHINE SHOP FOR SALE.

I will sell at low figures and at reasonable terms my magnificent Machine Works at Newark, Ohio, fully equipped with every necessary to make a first-class establishment It stands on two acres of ground in the center of this thriving city. A railroad switch runs into the works for loading and unloading; excellent railroad facilities; cheap living; an unusually healthy locality.

Address,

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W. S. IDE, President. R. T. CLARKE, Manager.

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VULCAN IRON WORKS CO.,

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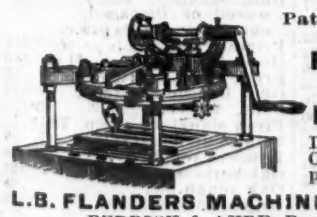
SPECIALTIES:

STEAM DROP HAMMERS,
STEAM HAMMERS,
POWER PUNCHES AND SHEARS AND POWER HAMMERS.

☞CIRCULARS, PHOTOGRAPHS, AND PRICES FURNISHED ON APPLICATION.

The Vulcan Iron Works Company.



Patent Portable Valve Seat

Rotary Planing Machine

Descriptive Circular on application.

L.B. FLANDERS MACHINE WORKS
PEDRICK & AYRE, PROP'RS,
1025 Hamilton Street, Philadelphia, Pa.
New Descriptive Circular on application

The Detroit LUBRICATOR COM'Y'S Sight Feed LUBRICATOR Cups.

For oiling valves and cylinders of steam engines, by the only perfect method, THROUGH THE STEAM PIPE. The oil passes IN SIGHT, drop by drop, into the column of steam where it vaporizes, thus becoming a STEAM LUBRICANT, oiling perfectly every part reached by the steam. Any CLEAN OIL, black or white, light or heavy, may be used. Saves from 50 to 90 per cent. in oil and wear of machinery, thus paying for itself several times a year. A cup will be sent to responsible parties on twenty day's trial if desired. In ordering give diameter of cylinder.

NOTICE.

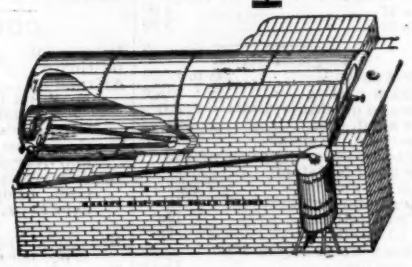
The first Lubricators ever made, showing the oil passing drop by drop through a transparent water chamber, were devised by us, and the same are fully embraced by many Letters Patent owned and controlled by us, which have been sustained in several hotly contested legal contests. Our customers, therefore, need have NO FEARS IN THEIR PURCHASE AND USE. We are the sole owners of the "Sight Feed" feature as claimed by us, and we shall hold purchasers and users responsible who are encroaching upon our rights by the unfawful use of our device. Address,

DETROIT LUBRICATOR CO.
Office, 98 Griswold Street, Detroit, Mich.

Note—In our recent suit against the American Lubricator Co., of Detroit, before Justice Stanley Matthews, of the U. S. Supreme Court, involving their "sight-feed" feature, a decree was rendered in our favor August 20, 1881. (Mention this paper)

☞ WM. BINGHAM & CO., Sole Agents for this territory.

Sharp's



Self-Acting Boiler Cleaner,
Warranted in Every Respect.

THOS. SHARP & CO.,
Salem, O.
Send for Circulars and Price List. Mention this Paper.

AIR FURNACE PROCESS.

MICHIGAN MALLEABLE IRON COMPANY:

Manufacturers of

REFINED

MALLEABLE IRON CASTINGS,

Detroit, Mich.

THE MORGAN

Variable Blast Water Tuyere Iron.

With the front plate removed, showing the rotating air-tubes through which four different currents of air may be passed thereby making any sized fire from two to eighteen in. diameter.

It actually saves one-half of the coal; makes an intense heat just where it is needed, and burns no coal unnecessarily Always gives a centre blast, and cleans all the dirt from the fire. Supplies hot water We also furnish a Tuyere on same principle without Water Attachment. All goods guaranteed to please or no sale. ■Catalogue sent free. Address,

A. W. MORGAN & CO.
52 Vance Block, Indianapolis, Ind.

Harmon, Gibbs & Co.

CORRY, PENNA.

IMPROVED SLIDE VALVE STATIONARY

Steam Engines

Send for Price List of Engines and Boilers.

Chicago Office—J. A. PEOPLES & Co., 28 South Canal Street.

AKRON IRON CO.,

AKRON, OHIO.

—— SOLE MANUFACTURERS OF PATENT ——

Hot Polished Shafting.

It is made of best Stock, perfectly round and straight, can be rolled accurately to any desired gauge; will not spring or twist in key seating, and has a magnetic oxide of iron surface, which makes it unequaled for line and counter shafting.

Price Lists, with References and other information, furnished on application to us or our agent.

☞ Ask for Price List No. 19. **AKRON IRON CO.**

S. E. BLISS, 89 Lake Street, Chicago, General Western Agent.

Detroit and Cleveland

STEAM NAVIGATION CO.'S LINE OF

Palaceteamers

STEAMERS

CITY OF DETROIT — NORTHWEST

Every week day between
CLEVELAND AND DETROIT.

Leave Detroit ....10:30 P. M. | Leave Cleveland 9:00 P. M.
Arrive Cleveland..6:00 A.M | Arrive Detroit..6:00 A. M.

Fare, Single Trip, $2.25 — Round Trip, $4.00, Berths Extra.

SUPERB FAST IRON STEAMER

CITY OF CLEVELAND,

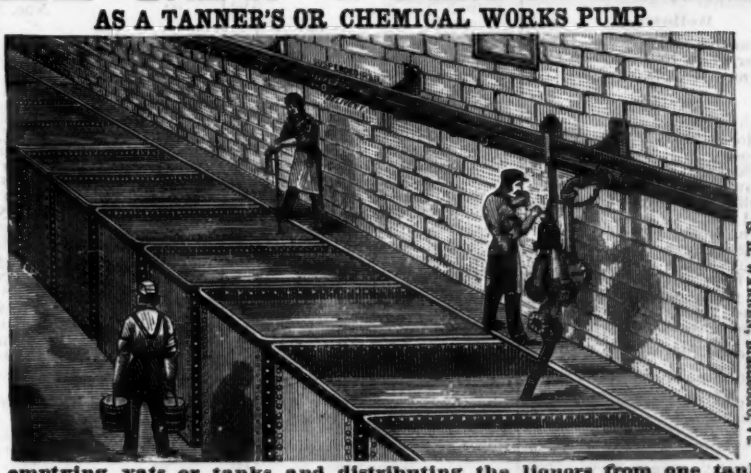
SEMI WEEKLY BETWEEN
DETROIT, MACKINAW AND PT. ST. IGNACE,
uching only at Marine City, St. Clair, Port Huron, Sand Beach, Ausable, Oscoda, Alpena, and Cheboygan.
Through Fare $4.00 — Meals and Berths Extra.

SEE ONLY—30 HOURS—MACKINAW TO DETROIT.

D. CARTER, General Manager. C. D. WHITCOMB, ■Gen'l Pass. & Tkt. Agent.
J. F. HENDERSON, Gen'l Freight Agent. T. F. NEWMAN, Ag't 23 River St., Cleveland, O.
General Offices, Detroit, Mich.

THE NEW PULSOMETER

AS A TANNER'S OR CHEMICAL WORKS PUMP.



"We have five of your Gun Metal New Pulsometers in use, and they all give us entire satisfaction."
CHARLES PFIZER & CO., Chemists, 81 Maiden Lane, N. Y.

"I have pumped liquor at 150 degrees with the No. 3, and find it fully up to the capacity claimed. I believe it to be the best pump for a Tannery run by steam that I ever saw."
S. H. WARREN, Brattleboro, Vt.

For emptying vats or tanks and distributing the liquors from one tank to another, or throughout the building, either by dropping a flexible suction from one tank to another, or by means of the pump suspended on a rail traversing the whole length of the tanks.

OFFICE OF GRAND LAKE STREAM TANNERY, F. SHAW & BROTHER.
PULSOMETER STEAM PUMP CO.: GRAND LAKE STREAM, Maine, April 7th, 1882.

The No. 4 Gun Metal New Pulsometer has been in operation for some time, and the results have been astonishing to us in comparison to pumps usually used by tanners for pumping liquor. It is always ready to start immediately that steam is admitted. It will empty a pit 7x8x6 feet in ten minutes, together with a large quantity of bark pieces, never clogging the valves or stopping the pump in any way. Altogether, the New Pulsometer Steam Pump outrivals anything in the pump line, that we ever saw, for pumping a large quantity in a short time, with a surprisingly small amount of steam. The No. 4 at Jackson Brook Tannery is working admirably.

Yours truly, F. SHAW & BRO.

Descriptive book with prices and testimonials mailed upon application to

PULSOMETER STEAM PUMP COMPANY, 83 JOHN ST., NEW YORK,
Chicago Office, 193 Lake Street, FRANK GRAY, Manager. OR TO **Boston Office, 32 Charlestown Street,** S. B. EVERETT, Manager.

ELECTRO-PLATING WORKS,

Salem, Ohio.

Machine Finishing and Electro-Plating

In Gold, Nickel and Silver.

SEND SAMPLE FOR SPECIAL ESTIMATE.

ALFRED F. SMITH, Salem, O.

LEETONIA BOILER WORKS,

Manufacturers of All Kinds of
Boilers, Blast Furnace Stacks, Oil Tanks, Plate and

SHEET IRON WORK.

Prompt Attention Given to Repairing.

Leetonia, Ohio.

Cleveland Wholesale Prices.

HARDWARE.

Adzes.

Carpenter's.....per doz $18 40
Ship..... " " 18 75
Heavy railroad.... " " 19 50

Axes.

Hunt's.....℔ doz $ 9 50
Lippincott's Crown.℔ doz 9 00
Cut More.℔ doz 9 00
Peck's Double Bit..℔ doz 22 00
"Champion Blade ℔ doz 11 00

Anvils.

Eagle, Amer...per lb. 10c dis 20
Wright's..... 10¾c@11c
Armitage's Mouse Hole 9¼@9¾c
Trenton..... 10¾c
Wilkinson's..... 10¾c

Anvil Vise and Drill.

Millers Falls Co. $28 ....dis 20
Cheney Anvil and Vise..dis 25&2

Vises.

Solid Box, list of July 1, '79, dis 35
Solid "Crown" (A. H. Hildick) 40 to 100 lb. 15c net
Solid, Peter Wright's 15½
Solid, Wilkinson's.....13½
Parallel, Parker's.....dis .0
Saw Filers. Hopkins' ℔ doz $17.50, dis 10
Reading.....dis 45&10
Lowell Hand Vises.....dis 20
Richardson's Vise and Anvil.....dis 25

Augurs and Bits.

C S cut augers.....dis 40&10
do do do bits.....40&10
D C gimlet do Ives....dis 50
Snells bits.....dis 40
Russell Jennings' augers dis 16⅔ &10&10&10
Cook's pat augur.....40&10

Animal Pokers.

Berea, per doz..... 4 00
Eagle, per doz..... 5 00

Apple Parers.

Domestic & Reading ℔ doz .$7 50
Turn Table..... 9 00

Bolts.

Machine.....dis 60
Plow.....dis 50
Plow, R. B. & W.....dis 40
Cast Iron Barrel Shutter, etc.....dis 5(&10
Cast Iron Chain (Sargent' list).....dis 60&10
Ives' Pat. Door Bolts..dis 50
Wrought Barrel.....dis 55&10
Wrought Square.....dis 55&10
Wr'g't Shut'r, all iron, Stanley's list.....dis 50&10
Tire, R. B. & W., new list.....dis 70&10
Stove, American Screw Co.'s.....dis 40
Bolt Ends 16c. per lb. net.....60

Bellows.

Dis

Blacksmith's com new list, 45 ℔ ct
Moulder's new list, dis 25 ℔ cent
Hand, new list, 25 per cent

Butts.

Dis

Wrought brass.....65&10
Cast, loose joint.....55&10
Pin, loose.....50&10
Wrought, fast joint narrow.....45&10
Wrought fast joint broad.....45&10
Wrought loose joint broad.....55&10
Wrought table and back flaps.....45&10
Loose joint, without acorns.....55&10
Ten per cent. extra dis for cash.

Cleveland Stamped Elbows

Genuine Russia Iron

4½inch, per doz			5 00
5	do	do	7 50
6	do	do	9 50
7	do	do	11 00

Planished American Russia Iron

4½inch	per doz		5 00
5	do	do	6 50
6	do	do	8 50
7	do	do	9 50

Charcoal Iron

4½inch, per doz			2 50
5	do	do	3 50
6	do	do	4 25
7	do	do	5 50

Discount 25 per cent

Chisels.

Hot and cold cutting....℔ lb 30
Railroad track.....30
Machinists.....30
Mallet head.....50
Tape.....50
Packing.....50
Stone cutters.....50

Crowbars.

Cast steel.....℔ lb 8¼
Iron, steel points.....6¾c

Cutlery, Pocket and Table.

Meriden Cutlery Co, table..net
Am. Miller Bros.' Cutlery Co.....dis 25
Humason & Beckley, pocket 33⅓
Naugatuck Cutlery Co...list net
Aaron Berkenshaw's pocket dis 25

Coopers' Tools.

Bradley's.....dis15@20
Braton's.....dis15@20

Chains.

Coil by cask.....

3-16	¼	5-16	⅜	7-16	½
10¾	9	8	7	6½	6¼

Drills and Drill Stocks.

Blacksmiths', each...$2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W.....dis 20&10

Drawing Knives.

Witherby's.....dis 65@10
Nobles Mfgr. Co.....15
Adjustable handle.....20

Emery and Emery Paper.

Regular Numbers.....℔ lb 6c
Flour and F. F.....℔ lb 4c
B. & A. Emery Paper..dis 30&5

Enameled and Tinned Ware.

Kettles.....dis 50
Sauce Pans.....dis 25
Tinned Sauce Pans.....dis 50

Files.

Auburn...$5 to £. dis 35 pr cent
E. M. Boynton's, new list..dis 25
J. & Riley Carr.....4.50 to £.
Johnson & Bro.....dis 30
Butcher's.....4.50 to £.
Walter Spencer & Co.'s "Diamond".....4.50 to £.
Fisher's.....4.75 to £.
Moss & Gamble.....4.50 to £.
H. Disston & Sons (new list).....dis 40 per cent
Heller Bros.' Horse Rasps dis 25
Nicholson.....dis 40
New American.....dis 40
Union File Co.....dis 40

Grindstones.

Ohio.....1¾@1¾ ℔ lb
Nova Scotia.....1¾@1½ ℔ lb

Hammers.

Maydole's.....dis 15
Cheney's.....dis 25
Hartford Hammer Co.....dis 20
Humason & Beckley.....dis 50
Verree.....dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75, dis 25&10
Nelson Tool Works...dis 40&10
Warner & Noble's.....dis 5
Kip's.....dis 15
Yerkes & Plumb.....dis 15
Wilkinson's Smiths' 11¼c ℔ net

Hatchets.

Yerkes & Plumb:--Shingling,

Nos.	1,	2,	3,

℔ doz $7 50, $8 00, $8 50, dis 25

Claw,

Nos.	1,	2,	3,

℔ doz $8 25, $8 75, $9 25, dis 25

Lathing,

Nos.	1,	2,	3,

℔ doz $7 50, $8 00, $8 50, dis 25

Nails.

20 to 60d	$3 50
8 and 9d	25
6 and 7d	50
4 and 5d	75
3d	1 50
2d	2 75
3d fine	3 00
2d fine	3 75
⅝ inch	3 00
4d barrel	1 00
1¼ inch barrel nails	1 50
1½ do do do	1 75
1 do do do	2 50
⅞ do do do	3 00
Cut spikes, all sizes	35
Clinch nails, all sizes	1 75
Casing and box nails	75
Finishing nails,	$1 25
Tobacco nails.	50

Nuts and Washers

Nuts, square.....7c off list.
Nuts, hexagon.....6c. off list.
Washers.....6c off list.

Picks.

Railroad, 4 to 5 lbs.	doz	$7 75
5 to 6 lbs.		7 75
to 7 lbs.		8 50
7 to 8 lbs.		9 50
Railroad Tamping Pick		
7 to 8 lbs.	doz	13 50
Mill Picks per lb.		75c

Rivets.

Iron.....dis 40
Tinned.....dis 40
Copper.....dis 33⅓

Squares.

Dis

Steel or iron, case lots.....50
Try squares and T bevels.....40

Spikes—WROUGHT

All lengths by ¼ inch.....4½c
do do do 5-16.....3½
do do do ⅜, 7-16 & ½in 3¼

Shovels and Spades.

Ames' new list, July 1, 1881.....dis 15
Old Colony.....dis 15
Remington's (Lowman's Patent).....dis 30
Rowland's.....dis 40 and 10
Griffiths.....dis 40&10

Saw Sets.

Boynton s patent X Cut, per doz $12; Hand Saw, per doz $10.....dis 20
Stillman's Genuine, per doz $3 50 and $5 50.....dis 20
Stillman's Imitation, per doz $3 25.....dis 20&10
Common Lever, per doz $2 dis 30&10
Leach's No. 0 $8; No. 1 $15; dis 15
Hammer, Hotchkiss $5 50, dis 10
" Bemis & Call Co.'s new patent.....dis 40&5
Bemis & Call Co.'s Lever and Spring Hammer..dis 30&5
Bemis & Call Co.'s Plate..dis 10
" " Cross-cut dis 12½
Aiken's Genuine...$13, dis 50&10
" Imitation.....$7, dis 50
Hart's Patent Lever.....dis 20
Disston's Circular.....dis 40

Sad Irons.

From 4 to 10 lbs....per lb 3¾ net
Self-Heating.....℔ doz $9 net
" Tailors..℔ doz $18 net
Gleason's Shield and Toilet.....dis 25
Mrs. Pott's Irons, double pointed.....dis 35
Mrs. Pott's Irons, square back.....dis 35
Enterprise Star Irons.....dis 35
Combined Fluter and Sad Iron.....℔ doz $15, dis 15

Scales.

Hatch, Counter, No. 171 ℔ doz. $42, dis 37½&10
Union Platform.....$6, dis 45
Fairbanks'.....dis 20
Buffalo Scale Co.....dis 20&5
Forsyth Scale Co.....dis 25
Howe's.....dis 20&10
Chatillon's Eureka.....dis 25
Family Universal.....dis 50
Scale Beams.....dis 33⅓&10

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Planes.

Ohio Tool Co.....dis 25
Sciota.....dis 30
Bailey's Pat. Adjstble..dis 20@25

Rules.

Stanley.....dis 66⅔ and 10

Sash Locks. Discount.

Payson Mnfg. Co. "Perfect"..42
Simmons' Sash Supporters....20

Hinges.

Champion double acting spring hinges.....dis. 30
Screw & Strap 8@12in.....$6. net
Gravity Locking Blind Hinges, Sargeant & Co. 70&10

Screws. Dis

Flat head iron or steel per cent dis.....30
Flat head brass.....30
Round head iron or steel..25
Round head brass.....20
Brass and Silver capped..40
Japanned, list of Plain Screws.....20
Coach, patent Gimlet point, list per 100.....60
Lag, taper points.....60
Bed.....10
Machine, flat head, iron round head, iron.....55 50
Bench, iron.....55&10
wood, beech, per doz $3.....10
wood, hickory.....20&10

Valves. Dis.

Jenkins' Patent Gate Valves..35
" " Globe " ..40
" Standard Packing " ..20

Wrenches.

Coe's genuine.....40 & 10
Girard Standard.....dis 50 & 10
Mechanics' 10 and 10.....dis. 40

Wire.

Brass and Copper.....dis 30
Bright & annealed, Nos. 0 @ 18 dis 50@52½
" " Nos. 19 @ 26 dis 60
" Nos. 27 @ 36 dis 65
Coppered Nos. 0 @ 18, dis 45@47½
Galvanized, Nos. 0 @ 18, market list,.....dis 40@42½
Tinned, Nos. 0 @ 18,..dis 45@47½
Cast steel.....dis 40
Tinned Broom Wire, Nos. 18 @ 25.....dis 55
Annealed Fence, Nos. 8 and 9.....dis 55@52½
Annealed Grape, Nos. 10 to 14.....dis 50@52½
Galvanized Telegraph, Nos. 7 to 9.....℔ lb 7¼c
Galvanized Telegraph, Nos. 10 to 11.....℔ lb 8¼c
Galvanized Telegraph, No 12.....℔ lb 10¼c
Fence staples.....℔ lb 5½@5¾c
Fence Staples, galvanized, ℔ lb 7@7¼c
Stubs Steel Wire..$6 00 to dis 30
Barb Wire, painted.....8¼c
Barb Wire, galvanized.....9¼c
Crucible Steel Ropes from ¾ in. at 9c to 1¼ in. at.....52c
Best Selected Iron Ropes from 3-16 in. at 3c. to 1¼ in. at.....33c

Boiler Plates.

("Gaylord"--Standard Quality.)

C. No. 1	4 50
C. H. No. 1 Sheil	4 75
C. H. No. 1, 50,000	5 25
C. H. No. 1, 55,000	5 75
C. H. No. 1 Flange	6 50
Firebox	
T. S., 60,000 (as per)	6 50
T. S., 65,000 (act of)	
Homo. Steel, 70,000 (of Cong)	7 50

Heads, ¼c ℔ lb. extra.
N.B.—Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

Sheet and Tank Rivets. "Norway."

All sizes.....dis. 15

Boiler Rivets—"Albany."

½, ⅝, 11-16, and ¾ in. diam. 5 50

Boiler Makers' Tools.

Doty's Power Shears....net list
" Hand Lever Shears..net list
" Power Punch.....net list
" Hand Punch.....net list
Steel Screw Punch.....net list
Iron Screw Punch.....net list
Boiler Plate Rolls.....net list
Buffalo Forges & Blowers dis 20
Watson's " " net list
Spring Tube Expander....dis 15
Roller Tube Expander..net list
National Tube Cleaner....dis 20
Wire Flue Brushes.....net list
Anvils—"Peter Wright" 12½ ℔ lb
Solid Box Vises.....net list

Nuts, Bolts, etc.

Square & Hex. Nuts....7 off list
Washers.....6c. off list
Machine Bolts.....dis 65
Bolt Ends.....dis 60
Boiler Patch Bolts.....net list

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch.....dis 37½
"National" Standard Gauge 11 inch to 15 inch.....dis 25
"National" Special Locomotive Tubes.....net list

IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅛ to 1 inch	2 50
4½ to 6 by ⅛ to 1 inch	2 60
1½ to 6 by 1⅛ to 1¼ inch	2 90
1¼ &1¼ by ⅛ to ½	2 60
1 & 1¼ by ⅛ to ½	2 70
⅝ ¾ and ⅞ by ⅛ to ½	2 90

Round.

¼ to 1⅛ inch	2 50
2 to 2½	2 70
2⅝ to 3¼	3 00
3⅜ to 4	3 50
4⅜ to 4½	4 00
4⅝ to 5	4 20

Square.

¼ to 1⅛ inch	2 50
2 to 2½	2 70
2⅝ to 3¼	3 00
3⅜ to 4	3 50
⅜ to ½	2 60

Heavy Band.

1½ to 6 by ⅛ and 5-16 inch	2 70
1 to 1½ by ⅛ and 5-16 do	2 80
⅝ to ⅞ by ⅛ and 5-16 do	3 10
⅝ to ⅞ by ⅛ and 5-16 do	3 50

Half Oval and Half Round.

Wagon box iron ⅝ and ¾.. 4 00
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1½ to 6 by ⅛ to 3-16..... 3 00

Hoops.

1⅛ to 2, Nos 16 to 18	3 40
1⅛ to 4 do 13 to 15	3 30

1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24	4 50
No 25 to 26	4 70
No 27	4 90
No 28	5 30

English Steel.

Best cast	℔ lb 15½c
Extra cast	16¾c
Round machinery, cast	14c
Swaged, cast	18c
Best double shear	15½c
Blister, 1st quality	13c
Refined tool steel	16¾c
Spring calking	7¼@7¾c
German steel, best	11c
2d quality	10c
3d quality	9c
Sheet cast steel, 1st quality	15½c
2d quality	14½c
3d quality	12½c

American Steel.

Best brands of refined cast steel, ¼ to 2 inches	12c
Crucible cast	7c
Open-hearth ditto	4½c
Hammer cast steel	9c
Spring cast steel	7½c
Bessemer and open-hearth spring	5c
Ditto plow	4½c
Steel boiler plate	6½@7c
Bessemer machinery	5 @6c
Spring and calking	7¼@7½c
Tire	5
Sleigh shoe	5

Bessemer Steel Tire.

¾ to 1 by 3-32	4½ ℔ lb
¾ to 1 by ⅛ to 5-32	4½ ℔ lb
¾ to 1 by 3-16 to ¼	4½ ℔ lb

Miscellaneous Cast Steel.

Auger and auger bit	1
Axle steel for wagons	7
Frog points and plates	8
Frog size bars	8½
Pick, hammered	10
Mattock, beveled	9
Table cutlery	7½
Trap spring steel	10
Pike and cant hook	9
Coal and granite	8½

TINNER'S STOCK.

Tin.

Banca,	per lb.	26c
Straits	"	26c
English	"	27c
Bar	"	27c

Tin Plate.

IC 12x12 charcoal	$ 6 50
IC 14x20 do	6 25@6 50
IX 14x20 do	8 25
DC 12½x17 do	6 00
DX 12½x17 do	8 00
DXX, 12½x17 do	10 00
DXXX, 12½x17 do	12 00
IC, 20x28 do	14 50
IX, 20x28 do	15 50
IC, 14x20, Best Roof	6 00
IX, 14x20, do	8 00
IC, 20x28 do	13 00
IX, 20x28 do	14 50
IC, 10x14 Best Coke	5 75

Solder.

Half and Half, in bars	15½
No. 1 do	14½
Spelter Solder	25

Pat Planished Sheet Iron.

A				per lb	10½c
B					9½c
Nos	10 to 14	15 to 20	21 to 24	25 to 26	
Com	3-60	3-80	4-00	4-20	
Char	5-60	5-60	6-00	6-20	

Sheets over 28 in. wide ¼c extra

Zinc.

Sheet, cask	8c
Sheet, open	8@ 8¼

Cutlery.

Meliden Cutlery Co., (Table).....net
Am. Miller Bro's Cutlery Company.....dis. 25
Humason & Beckley, Pocket.....dis. 33⅓
Naugatuck Cut. Co.....list net
Aaron Burkinshaw's poc..dis.25

Tinners' Tools & Machines.

Machines (P. S. & W.) list add 20
Tools (P. S. & W.).....add 6

Plumbers', Steam and Gas Fitters' Supplies.

Wrought Iron Pipe.....dis 65.
Malleable Iron Fittings..dis 10
Grey Iron Fittings.....dis 50
Steam Brass Goods.....dis 55
Water " ".....dis 50
Ludlow Gate Valves.....dis. 20
Register Gauge Cocks net 1 00
Montg'ry Gauge Cocks..$1 each
Steam Gauges.....dis. 40
Steam Guages 5 in. net dial per doz.....30 00
Scotch Glass Tubes.....dis. 60
Tools.....special.
Duplex Injectors.....net.
Soil Pipe & Fittings, Mott's List.....dis. 25
Sinks, Mott's List.....dis. 25
Copper Bath tubs, sinks, etc.....dis. 20
Galvanized Iron Boilers "Scaifes."....dis. 45
Marble Slabs, Counter-sunk net per ft.....$ 1 25

Babbitt Metal.

Babbit Metal, No. 3, 14 X	42
Babbit Metal, No. 2, 16 XX	46
Babbit Metal, No. 1, 18 XXX	50
Babbit Metal, C.	20
Babbit Metal, B.	24
Babbit Metal, A.	32

Dis 40 per cent.

LEAD.

American, ℔ lb	4½c
Bar, ℔ lb	6½c dis 10 per ct
Pipe, ℔ lb	7½c dis 10 per ct
Sheet, ℔ lb.	8c dis 10 per ct
Tin-lined pipe ℔ lb	15c dis 10 pr ct
Block	45c.
Chilled Shot	8c

COPPER.

Lake Ingot	18 @18½c
Baltimore	17½@17¾c
Arizona	17¾@17¾c

Sheathing Braziers Copper, Bolts, &c.

Brazier's Copper, ordinary sizes, 16 oz. per sq foot, and over per lb.....30c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq foot, per lb. 32c
Brazier's Copper, 10 oz and 12 oz. per sq ft. per lb. 34c
Brazier's Copper lighter than 10 oz. per sq ft. per lb. 36c
Circles less than 84 inches in diameter. per lb. 33c
Circles 84 inches in diameter and over.....per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz per sq. ft. per lb. 28c
Bolt Copper.....per lb. 30c
Copper Bottoms..per lb. 31@32c

No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x18.....per sheet 6c

All other size sheets, 2½c per square foot For tinning both sides, double the above amount.

SCRAP IRON AND OLD METAL

DEALER'S SELLING PRICES.

	Net Tons.
No. 1 wrought scrap	$24
Sheet and hoop "	10@11
Cast scrap, (No. 1 heavy)	19
Cast Scrap (Stove Plate)	12

OLD METALS.

Old copper per lb	15c
No. 1 H. Brass per lb	14
Heavy yellow Brass do	12
Light Brass per lb	8
Scrap Zinc per lb	3½
Tea Lead per lb	4
Heavy Lead per lb	3

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas Pipe.

Inside Diameter Inches.	Plain, Price Per Foot.	Galvan or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛	08		.40	.24
¼	08	$0 11	.54	.42
⅜	09	12	.67	.56
½	11	15	.84	.85
¾	13½	19	1.05	1.13
1	19	28	1.31	1.67
1¼	27	40	1.66	2.26
1½	33	47	1.90	2.69
2	46	64	2.37	3.66
2½	75	1 00	2.87	5.77
3	95	1 30	3.50	7.55
3½	1 25	1 70	4 00	9 05
4	1 50	2 05	4.50	10.73
4½	1 75	2 40	5.00	12 49
5	2 25	3 00	5.56	14.56
6	2 75	4 00	6.62	18.76
7	3 75	....	7.62	23.00
8	4 75	....	8.62	28.00
9	6 50	....	9.68	34.40
10	8 00	....	10.75	40.64
12	12 00	....		54.65

Discount, 65 per cent.

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Brass.

All Nos. not thinner than No. 28, wider than 2 in. not wider than 14 inch.....30c
All Nos to No. 28, inclusive, and widths over 14 to 20 in. inclusive.....35c
All Nos. to No 28, inclusive, and widths over 20 to 30 in. inclusive.....38c
½c per lb. advance on each No. above Nos. 28 to 38, inclusive.
All Brass thinner than No. 8 is Platers' Brass at.....53c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches .37c

Low Brass.

4c per lb. more than High Brass.
Gilding metal 8c per lb. more than High Brass.
Platers' or Gold Metal

In Bars	48c
Sawed	51c
Planed or Polished	54c

For Slitting.

Metal in width in. to ¼ in. to No. 28, inclusive, 1c per lb advance.
Metal, in width 2 in. to 1 in., thinner than No. 28, 2c per lb. advance.
Metal, in width ½ in. to ¼ in. thinner than No. 28, 5c per lb. advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths, add 7c per pound.

COAL,

WHOLESALE.

Wholesale f.o.b. cars at Cleveland:

Carbon Hill and Monday Creek	$2 65
Massillon	2 75
Brier Hill	3 50
Pittsburgh	3 00
Salineville	2 25
Tuscarawas	2 25

RETAIL.—Delivered.

Massillon Lump	$3 75
" Nut	3 50
Carbon Hill and Monday Creek, lump	3 50
Carbon Hill and Monday Creek, nut	3 25

75c less on cars by car load.

Anthracite Stove and Chestnut	7 00@7 25
Egg and grate	6 00

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15	
11x14 to 15x24	8 50
16x24 to 20x28	9 75
15x34 to 24x30	10 75
26x28 to 24x36	11 50
26x36 to 26x44	13
26x46 to 30x50	14 00

DOUBLE THICKNESS

6x8 to 10x15	11 7
11x14 to 15x24	13 25
16x24 to 20x28	15 75
15x34 to 24x30	17 25
26x28 to 24x36	18 50
26x36 to 26x44	21 25
30x50	22 50
30x52 to 30x54	23 25
30x56 to 34x56	25 00
34x58 to 34x60	27 75
36x60 to 40x60	30 00

Dis 60 & 15 single, 60 & 20 double

OILS.

Pure Oils. packages included

Sperm, winter bleached per gal	$1 25
Whale, winter bleached per gal	63
Straits	50@53
"A" oil for tanner's use	35 @40
Lard oil extra W S	1 05@1 10
do No 1 do	85@87
do No 2 do	72@77
Tallow oil	74
Neatsfoot oil pure	90@95
do No 1	80@85
Linseed oil, raw	52
do do boiled	55
Cotton seed oil white	64 @ 66
do do yellow	60 @ 63
West Virginia lubricating 28 deg	20c@30c
Pure Mecca	55@ 50
Paraffine oil winter pressed	25@ 30
Machinery	40
Engine	50
Miners' oil	40@45
Drilling oil	40

Hides and Leather.

Prime cured hides	8½@8¾
Green hides	6@6½
Bull, scrubby, badly scored or damaged, cured, two-thirds price.	
Prime dry hides	12@14
Horse hides, green	$1 75@2 00
Prime cured veal calf	13
Ohio Deacon S, salted	65@70
Pelts, wool on	22@24
Fresh slaughter sheep	30@$1 50
Prime cured calf skins	13
Hemlock rough	22@24
Oak harness	34@38
Oak rough	25
Union harness	32@35

Cleveland Business Directory.

Assayers and Analytical Chemists.

JUDSON, W. E. Analytical Chemist, 8 Cushing Block.

Bolt and Nut Works.

HOTCHKISS & GAYLORD, manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws.

Boiler Makers.

SMITH & TEACHOUT — (Established 1857.) Boiler, Tanks, Stills etc. 439 Broadway.

Bridge Builders.

BUCKEYE BRIDGE AND BOILER WORKS mfrs. of Arch & Truss Bridges, Boiler Tanks and Oil Stills. Bet. Wasson St. and Case Ave.

Coal and Iron Exchange.

JACKSON IRON CO. Iron Ore and Pig Iron. Rooms 8 and 9. Fayette Brown, Gen. Agent.

RHODES & CO. Coal, Iron Ore an Pig Iron. Rooms 1 and 2.

Carriage Blacksmith.

STRIEBEL, CHAS. manfac'r. of Carriages and Wagons and platform trucks. Horse shoeing and general blacksmithing .98 Woodland ave.

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts.

Church and School Furniture.

FAULHABER, GEO. manufacturer of School and Church Furniture. Fine Hard Wood work a specialty. 203 Ontario Street.

Custom Boots and Shoes.

ROONEY, JOHN manufacturer of hand-made Boots & Shoes, custom made and warranted 177 Ontario Street.

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection.

Coal and Pig Iron.

ANDREWS, HITCHCOCK & CO., Briar Hill Coal and Pig Iron. 122 Water Street.

Dyers.

BICHLMYER, A., 122 Seneca st. Gentlemen's and Ladies' Clothes Cleaned and Dyed.

Electrical,

ELECTRIC SUPPLY CO. manfrs and dealers in Electric Burglar Alarms, Annunciators, Cell Bells and Batteries. Telephone lines built and repaired. 145 Seneca Street.

Fresco Artists.

KEMMER & KUSHMAN DECORATIVE CO., Fresco Artists, Fine Modern Wall Papers. 838 Euclid ave.

Foundries.

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins.

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st.

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way.

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 435 Broadway.

File and Saw Works.

PARKIN, W. H. & CO., Hand-cut Files and Rasps, dealers in Disston's saws, 11 So. Water

Flue Cleaner.

CLEVELAND FLUE CLEANER M'F'G. CO. manufacturer of Aitchison & Doolittle's Patent Steam Flue Cleaner, 22 & 24 Power Block.

Hotels.

FOREST CITY HOUSE, cor. Public Square and Superior st., Terrill & Ingersoll, Props.

KENNARD HOUSE, D. McClasky, Prop.

NEW ENGLAND HOTEL, Water st., W. W. Wolcott, Prop. Refitted and refurnished.

STRIEBINGER HOUSE, between Ontario and Seneca sts. $2.00 per day. Hawley & Langton

CITY HOTEL, Seneca street. H. B. West, proprietor. $1.50 per day.

Hides, Pelts and Leather.

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow, 48 and 50 River street.

Hardwood Lumber.

MARTIN, J. T. dealer in Hardwood Lumber, Stone's Levee, near Central Way.

Lumber.

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st.

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed lumber, timber, lath shingles, etc. 47 Central Way

KRAUSE, C. A., & SON, wholesale and retail dealers in lumber. Yards cor. Superior and Wason and 281 Merwin streets.

Oil Manufacturers.

AMERICAN LUBRICATING OIL CO., manufacturers of lubricating oils, 23 Euclid ave.

Cleveland Business Directory.

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

CLEVELAND ROLLING MILL CO., manuf'rs. of Steel and Iron Wire and Steel Tire.

WORTHINGTON, GEO. & CO., Hardware and Dealers in Metals. Water street.

Lime Manufacturers.

RUSSELL LIME CO., manufacturers of White Lime; also dealers in Plaster, Cement, etc. 85 Elm street.

Machinery and Boilers.

CLEVELAND STEAM FURNACE CO., Engines and Boilers, cor. Detroit and Center sts.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street.

Machinery Depot.

CLEVELAND MACHINERY DEPOT, (now National Machinery Depot.) The largest stock of New and Second-hand Engines, Boilers and Machinists' Tools. Shop and Warehouse corner Bond and Superior streets.

Mercantile Agency.

THE MERCANTILE AGENCY. R. G. Dun & Co. proprietors. 121 Superior street.

Pattern and Model Makers.

WHITTINGHAM, J. & C., Metal Pattern and Model makers 52 Canal Street.

REID, J. C., Pattern and Model Maker. 52 Canal Street., (Up Stairs.)

COTTRELL & CO., W. L., Pattern Makers, 53 Center street.

STAIR BUILDER.

PFEIL, CHAS, Stair Builder; Hard Wood Mantles and Office Railing. Works, 49 & 51 Canal street, Cleveland, Ohio

Steel Stamps and Stencils.

FLEHARTY, J. H. & CO., Rubber Stamps, Seals, Stencils. 197 Superior street.

Steam Furnaces.

CUYAHOGA STEAM FURNACE CO., Manfrs of Land and Marine Engines. Machinery for Blast Furnaces, Rolling Mills, Bessemer Steel Works, &c. Mill-Gearing and all kinds of Castings, Foundry, Machine and Boiler Shops.

Trunks and Valices.

FABER, J. manuf. Trunk, Traveling Bags and Ladies' Fine Satchels. Sample Trunks and Cases a Specialty. 56 Public Square.

Vessel Agents.

WEBB, H. J. & CO., Ship Brokers and Vessel agents. 17 & 18 Board of Trade Building. 122 Water Street.

Wood Carving.

HERKOMMER, J., Carver and Ornamenter in Composition. 225 Erie street.

Business Directory.

Akron, O.

AKRON IRON CO., manufacture best Common, Refined and Charcoal Iron.

CASCADE HOUSE, cor. Mill and Summit sts., near Depot. J. Downie, Prop.

MCNEIL, J. C., Steam Boilers, Heavy Sheet Iron Work. Repairing promptly executed.

PERKINS, C. E., dealer in Agricultural Implements, machinery, and Manufacturers' Ag'nt

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc.

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street.

AKRON POLISHING & PLATING WORKS. Man'f'rs of solid leather wheels for polishers.

Alliance, O.

MCFARLAND, J. W. Engine and Machine Builder, and General Machine Jobbing.

Buffalo, N. Y.

SANDS, PAUL, Marine and Stationary Steam Engine Works mfr. of drilling machines, foot and power lathes. 70 Columbia street.

EMPIRE STATE MF'G CO., O. F. Swift, prop'r. manfr of Fluters, Sad Irons, Spun Copper & Half Copper Tea Kettles. Washington, cor. Ohio

WHITE, L. & I, J. manf'r's of Coopers' Tools. Carpenters' Tools, and Ship Tools Also manf'r's of Planer Knives and Machine Cutters to order 310, 312, 314 Exchange street.

THE BUFFALO NUT AND BOLT CO [Limited.] Manufrs. of Hot Pressed Nuts, Bolts, Washers, Rivets, &c. No. 226 Ohio Street.

Cuyahoga Falls, O.

THOMAS BROTHERS, manfrs of Ohio Stone Ware. Cuyahoga Falls Stone Ware Factory, cor. Main and Broad streets,

TURNER, VAUGHN & TAYLOR, manufacture engines, presses and grinding machinery for clay; also paper, chain, wire and flour mill machinery. Send for Circulars and price list.

SNYDER, H. wholesale manufacturer of Sash, Doors, Blinds, &c. Send for Price Lists.

THE CUYAHOGA FORGE AND IRON CO., manfrs. of every description Car, Truck and Driving Axles, Forging, Shafting, &c.

Wheeling, W. Va.

EXCELSIOR MACHINE WORKS, Redman & Co., general machinists and manufacturers of Marine and Stationary Engines, Hangers, Pulleys, Shafting, &c. Cor. 18th & Chapline streets.

Business Directory.

Canal Dover, O.

HECKMAN, E., manufr. and dealer in harness leather, upper, kipp and calf. Also, manufacturer & dealer in prime English Dairy cheese. Highest market cash price paid for hides.

Columbus, O.

PAT. ADJUSTABLE WINDOW CURTAIN Cornice, manufactured by Strader's Curtain Cornice Works.

ROYCE & PULLING manufrs of Patent Steam Pumps for all purposes. Store room 30 High street. Works Nos. 5 and 7 Scioto street.

U. S. CARRIAGE CO. builders of fine Carriages, Buggies and Phætons. Salesrooms and Office 257, 259 and 261 Fourth street.

REYNOLDS BROS., manufacturers of hand-cut Files and Rasps. Old files re-cut. Send for Price List.

CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted. Borger Bros. & Co.

MURRAY, HAYDEN & CO., manfrs of Malleable Iron. Cor. Randolph & West streets.

Canton, O.

DIEBOLD SAFE & LOCK CO., manuf'rs. Safes. Locks, Bank and Safe Deposit Works.

NOVELTY IRON WORKS, Mill work, Shafting, engines, Imperial job printing press, etc

NEW AMERICAN HOUSE, Canton. Fred. Hipp, Prop.

Erie, Pa.

GUNNISON, A. B., wholesale manufacturer of Wood Pumps. 233 East Twenty-Second St.

BALL ENGINE CO., limited, manufacturers of Automatic Engines of 15 to 30 horse power

NOBLE SEWING MACHINE CO. manfrs of the New Noble Sewing Machine. Send for circulars and prices.

A. B. FELGEMAKER & CO. Church Organ builders. Descriptive catalogue furnished on application.

Geneva, O.

THE ENTERPRISE MACHINE CO., L. L. Crane, Pres't, manfrs of Machinists' Tools and Machinery. Gear Cutting a specialty.

Lima, O.

LIMA HOUSE, centrally located; telegraph office in the house. J. Goldsmith, Prop.

Meadville, Pa.

CURRY & CO. general jobbers in Castings of all kinds.

Niles, O.

Reeves Brothers, Manufacturers of Boiler and Tank Iron, etc.

Olean, N. Y.

MYRICK BROS. & CO., manufact'rs Engines and Boilers, oil drilling tools, rig irons, etc.

Oil City, Pa.

REID, JOS. Machinist, steam engine and pump repairing. Brass and iron castings, light and heavy, made on short notice.

Pittsburgh, Pa.

PRINTING PRESSES. W. A. Bunting, manufacturers' agent. Printers supplies, type, cards. 42½ Sixth Street. [Up stairs.]

BAIR & GAZZAM, practical machinists; gear cutting a specialty. Rice's Feed Water and Heater. 17 Wood street, corner First Avenue.

Painesville, O.

NORTH AMERICAN CUTLERY CO., m'fr's of Steel Shears and Scissors—best quality.

Ravenna, O.

THOMPSON, T. F., dealer in Agricultural Implements, farm machinery, hardware, seeds, fertilizers, &c. Cor. Main and Prospect sts.

BALDWIN, D. L. & SON, Contractors & Builders and manfrs of all kinds of Moulding, flooring, siding, &c. Rip, Band and Scroll Sawing.

Rheims, N. Y.

GREAT WESTERN CHAMPAGNE. Finest made in America. Equal to best imported. Has taken highest awards everywhere, and is used all over the Continent. Try a case, and you will have no other. Pleasant Valley Wine Co., Rheims, N. Y.

Rochester, N. Y.

GOWE, JNO. N., mfrs. of Specialties, such as Machine forging, bridge bolts and trusses, railroad switches, spike, mall, chisels, &c.

ELEVATORS for Hotels, Factories and Private Houses. J. S. GRAHAM & CO.

WOOD-WORKING MACHINERY. Send for Catalogue. J. S. GRAHAM & CO.

RAZOR STROPS. Sole mfrs. of all kinds of Razor Strops. Utscht, Linn & Co. 181 N. Water

Steubenville, O.

DORRANCE, D. W., Tool Works, manufacturer of hand-made miners' and stone-cutters' Tools Promp attention given to mail orders.

Sandusky, O.

SANDUSKY WHEEL CO. manfrs. of Sarven Patent Wheels, Carriage Bodies and Seats, Plain Wood Hub Wheels, Banded Hub Wheels, Jacob's Patent Neck Yokes.

Business Directory.

Sandy Lake, Pa.

EBERMANN, W. S. & SONS, manfrs. of the celebrated Ebermann Boiler Feeder. Send for Circulars and Price List.

Titusville, Pa.

FOSTER & MCKAY, dealers in boilers and engines, tubing, casing, old iron, rope, and all kinds of metals. Washington street, nr. Railroad.

Toledo, O.

BAKER, HERBERT, Machine Shop and Iron Foundry. 98 and 100 Erie street.

TOLEDO FOUNDRY AND MACHINE CO builders of Steam Engines, Circular Saw Mills and all kinds machinery. Water St., cor. Cherry

RUSSELL IRON WORKS, mnfrs. of Architectural Iron Work, castings, pulleys, shafting and steam bending machinery. Cor. Water and Lagrange streets

STANDARD SAW WORKS, H. Bartley, manufacturer and dealer in Saws of every description. All kinds of Springs made from Sheet Steel. Reaper, Hay Knives Truss Springs, &c. made to order. 92 St. Clair Street.

UNION Wooden Ware Manufacturing Co. manufacture Sewing machines, washboards, children's wagons, carts, wheelbarrows, sleds, kitchen wooden ware, &c.

HEPBURN BROTHERS, proprie. Union Boat Works. Boats of all kinds made to order. For sale or rent. Water Street foot of Cherry.

Union City, Ind.

LAMBERT, J. W. & CO., mfrs of fork, rake, hoe and broom handles; spokes, hubs, whiffletrees, yokes, plow-rounds, &c. Correspondence solicited.

Youngstown, O.

BELL, EDWIN & SON, manuf. of Nail Kegs, Pat. coiled hoops, slack barrel and keg heading and oil barrel stock.

DINGLEDY, G. H. dealer in rough and dressed Lumber, Shingles and Lath.

MORTON HOUSE, formerly Maitland House, James Morton, Prop.

TOD HOUSE, cor. Diamond and Market streets. Henkel & Bowman, Props.

THE FORSYTH SCALE CO. Scales, Trucks, Copying Presses and Express Barrows.

Zanesville, O.

KIRK HOUSE, William Kirk, proprietor. $1.50 per day.

Brattleboro', Vt,

A JOY FOREVER!

ESTEY ORGANS

Manufactured by

J. ESTEY & CO.,

Brattleboro', Vt.

(Catalogue free on application.)

CLEVELAND NON-CONDUCTING CO.

MANUFACTURERS & DEALERS IN

ASBESTOS, HAIR FELT, CEMENT, & OTHER

Pipe Coverings,

19 SOUTH WATER STREET, LAND, OHIO.

Smith & Curtiss,

JOBBERS OF

TEAS,

COFFEES AND SPICES

ALSO PROPRIETORS OF THE

CLEVELAND

Coffee and Spice Mills,

107 & 109 Bank Street,

Cleveland, O.

TRAVELERS' REGISTER.

Lake Shore & Michigan Southern.

TRAINS GOING EAST.	Arrive. From West.	Depart. From East.
Fast N. Y. Express	*1 35 a m	*1 50 a m
N.Y.,Boston & AtlanticEx.	*7 05 a m	*7 30 a m
Elyria Accommodation	†8 35 a m	.....
Pt.Clinton Accommodation	†11 00 a m	.....
Buffalo Accommodation	†11 00 a m	†11 15 a m
N. Y and Boston Fast Ex.	*2 25 p m	*2 55 p m
Conneaut Accommodation	.....	†4 50 p m
Night Express	†10 10 p m	†10 35 p m

TRAINS GOING WEST.	Arrive. From East	Depart. From west.
Fast Limited Express	*12 23 a m	*12 33 a m
Mich. Ex. via Sandusky	*2 50 a m	*3 05 a m
Chicago Ex. via Sandusky	†6 35 a m	7 00 a m
Mich. Accom. via Norwalk	.....	†6 40 a m
Conneaut Accommodation	†8 40 a m	.....
Toledo Ex. via Norwalk	†1 25 p m	†3 30 p m
St. Louis Ex.via Sandusky	*1 40 p m	*2 05 p m
Chi. Pac. Ex. via Norwalk.	*7 05 p m	*7 35 p m
Pt.Clinton Accommodation	.....	†5 00 p m

■Sunday trains for Nottingham—Depart 9:00 a m m. and 2:15 p. m., return at 10:05 a. m. and 4:45 p. m.

Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.

Cleveland, Columbus, Cincinnati & Indianapolis.

ARRIVALS.	
No. 2 Col. & Cin. & Ind'polis Ex.	*7 10 A.M
No. 8 C. T.V. & W. & Clev Accom	10 30
No. 12 St. Louis & New York Exp.	*3 00 P.M
No 6 Indianapolis & Columbus Exp	10 20
No. 4 Columbus & Cincinnati Exp.	*3 40
No. 10 Wheeling Express	7 15

DEPARTURES.	
No. 1 Cincinnati & Columbus Exp.	*8 00 A.M
No. 11 Cleve, Indianap. & Wheel'g Ex.	7 10
No. 3 Special St. Louis & Cincinnati Ex**	1 55 P.M
No. 5 Night Express,	*7 25
No. 7 C.T.V. & W. & Col. Accom	4 00

**This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.	
Wheeling & Cleveland Express	8 25 P.M
Uhrichsville Express	10 30 A.M

DEPARTURES.	
Wheeling & Cleveland Express	7 15 A.M
Uhrichsville Express	4 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.	a.m.	a.m.	p.m.	p.m.
Through from East	6 50	.....	.....	*7 00
N.Y. P. & O. (Mahoning)	10 55	.....	2 00	*7 00
Pittsburgh Express	.....	.....	2 00	*7 00
Pittsb'g& Youngs'tn Ac	10 55	.....	.....	10 15
DEPARTURES.	**a.m.**	**a.m.**	**p.m.**	**p.m.**
Through Eastern Train	*7 10	.....	.....	10 45
N. Y. P. & O.(Mahoning)	.....	.....	.....	4 25
Youngs'tn & Pitts'bg Ac.	.....	11 00	.....	.....
Pittsburgh Express	.....	*7 10	*2 30	.....

Cleveland & Pittsburgh.

	ARRIVE.	DEPART
Pittsburg & Wheeling	2 30 P.M	8 25 A.M
Express	7 30	2 00 P.M
Alliance Accommodation	10 10 A.M	3 45
Ravenna Accommodation	8 37	5 30
Night Express	6 25 A.M	†11 40 P.M
Newberg Accommodation	12 10 P.M	11 00 A.M
Newberg Accommodation	1 50 P.M	12 30 P.M

†Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

	ARRIVE.	DEPART
Wheeling Junction	10 15 A.M	8 30 A.M
Canton	1 30 P.M	5 00 P.M
Wheeling Junction	6 15 P.M	3 20 P.M

Special trains leave on Sunday at 8.25 A. M. and 4.20 P.M., arriving at Cleveland at 1005 A M. and 6.25 P. M.

Depot foot of South Water Street.

Connotton Valley Railway.

	ARRIVE.	DEPART
Passenger	8 00 a. m.	8 10 a. m.
Passenger	10 20 a. m.	2 00 p.m.
Passenger	6 35 p. m.	4 25 p.m.

Depot corner Commercial and Fifth Streets

Cleveland, Akron & Columbus Railroad.

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Railroad to Hudson, for Akron, Columbus, etc.

	ARRIVE.	DEPART.
Mail	2 30 P.M	8 25 A.M
Express	7 30	2 00 P.M
Accommodation	10 10 A.M	3 45 P.M

CLEVELAND & PITTSBURGH

RAILROAD.

Condensed Time Table of Passenger Trains, corrected to Nov. 27, 1882.

MAIN LINE—GOING WEST.

	Day Expr'ss.	Mail Expr'ss.	Fast Line.	Accom.
Leave				
Pittsburgh	8 30 a.m.	1 55 pm	11 50 pm	4 00 pm
Allegheny	8 40	2 05	12 00 am	4 10
Arrive				
Rochester	9 25	2 55	12 50	4 55
Beaver	9 30	3 01	12 56	5 01
E. Liverpool.	10 07	3 34	1 38	5 43
Wellsville	10 18	3 45	1 50	5 55 pm
Salineville	10 57	4 22	2 33	Arrive.
Bayard	11 35	4 57	3 20	.....
Alliance	12 05 p m	5 25	3 55 am	.....
Leave				
Alliance	12 20	5 30	4 05	7 40 am
Arrive				
Ravenna	12 58	6 03	4 44	8 20
Hudson	1 24 p.m.	6 27	5 12	8 50
Cleveland	2 30 p.m.	7 30 pm	6 25 am	10 10 am

Accommodation train leaves Ravenna at 6:50 a.m., and arrives at Hudson at 7:20 a.m., Cleveland 8:37 a.m.

Fast line and Day Express run through Sleeping Cars from Pittsburgh to Cleveland.

NOTE.--Fast Line leaves Pittsburgh Sunday nights, but not on Saturday nights.

MAIN LINE--GOING EAST.

	Pittsb'g Express	Fast Line.	Day Expr'ss.	Accom.
Leave				
Cleveland	8 25 am	2 00 pm	11 40 pm	3 45 pm
Arrive				
Hudson	9 32	3 00	12 50 am	4 50
Ravenna	10 06	3 32	1 20	5 23
Alliance	10 49	3 58	2 00	6 00
Bayard	11 20	4 27	2 50	.....
Salineville	12 10 pm	5 10	3 40	Leave.
Wellsville	12 50	5 49	4 33	8 08 am
E. Liverpool.	1 20	6 05	4 57	8 19
Beaver	1 59 pm	6 40	5 47	9 04
Rochester	2 05	6 45	5 53	9 10
Allegheny	2 55	7 35	6 45 am	10 20
Pittsburgh	3 05	7 45	6 55	10 30 am
Harrisburg	.....	4 15 am	4 00 pm	.....
Baltimore	.....	7 45	7 20	.....
Washington	.....	9 15	8 47	.....
Philadelphia	.....	7 56	7 35	.....
New York	.....	11 15	10 35	.....
Boston	.....	8 00 pm	.....	.....

Accommodation train leaves Cleveland Union Depot at 5:30 p. m., arrives at Hudson at 6:53 p. m., Ravenna 7:20 p. m.

All trains connect at Yellow Creek for Wheeling and Bellaire.

Fast Line runs through Sleeper to New York. Day Express runs through Sleeper to Pittsburgh.

WM. M. BALDWIN, Manager,
E. A. FORD, Gen. Pass. & Tkt Agt Pittsburgh.

C. L. Kimball, District Passenger Agent, corner Bank and St. Clair sts., Cleveland.

Blue Grass Route of Ohio

TIME TABLE.

The Cleveland, Mt. Vernon and Delaware RAILROAD.

GEO. D. WALKER, RECEIVER.

SOUTH-BOUND TRAINS.

	Mail.	Expr'ss.	Acc'm	Acc'm.
Leave.				
Cleveland	8 25 am	2 00 pm	3 45pm	.....
Hudson	9 40	3 10	5 00	.....
Cuyahoga Falls	9 57	3 27	5 20	.....
Akron	10 12	3 42	5 47	.....
Clinton	10 42	4 14	6 19	.....
Warwick	10 47	4 19	6 25	.....
Orrville	11 14	4 45	6 51	.....
Fredricksburg	11 45	5 17	7 23	.....
*Holmesville	11 55	5 27	7 33	.....
Millersburg	12 08	5 40	7 45	5 35
*Killbuck	12 22 pm	5 54	.....	5 49
Gann	1 00	6 53 S	.....	6 49 B
Danville	1 11	7 04	.....	7 01
Gambier	1 31	7 24	.....	7 21
Mt. Vernon	1 45	7 38	.....	7 34
*Mt. Liberty	2 07	8 00	.....	7 53
Centerburg	2 19	8 12	.....	8 05
*Condit	2 33	8 26	.....	8 19
*Sunbury	2 43	8 36	.....	8 29
Westerville	2 05	8 59	.....	8 52
Columbus	3 30	9 25	.....	9 20
Cincinnati	8 00	.....	.....	.....

NORTH-BOUND TRAINS.

STATIONS.	Expr'ss.	Mail.	Acc'm	Acc'm
Leave				
Cincinnati		8 00 am	.....	.....
Columbus	7 20 am	12 25 pm	.....	5 15 pm
Westerville	7 45	12 50	.....	5 43
*Sunbury	8 08	1 11	.....	6 06
*Condit	8 19	1 21	.....	6 17
Centerburg	8 33	1 35	.....	6 31
*Mt. Liberty	8 45	1 47	.....	6 44
Mt. Vernon	9 11	2 12	.....	7 08
Gambier	9 24	2 25	.....	7 24
Danville	9 44	2 45	.....	7 44
Gann	9 57	2 57	.....	7 56
*Killbuck	10 35	3 35	.....	8 32
Millersburg	10 51	3 50	5 45am	8 45
*Holmesville	11 04	4 03	5 58	.....
Fredricksburg	11 15	4 12	6 08	.....
Orrville	11 50	4 45	7 10 B	.....
Warwick	12 14	5 10	7 37	.....
Clinton	12 19	5 15	7 46	.....
Akron	12 50 pm	5 47	8 20	.....
Cuyahoga Falls	1 02	6 01	8 33	.....
Hudson	1 20	6 20	8 53	.....
Ar.Cleveland	2 30	7 30	10 10	.....

* Stop on signal. B Breakfast. S Supper.

N. MONSARRAT, Gen'l Supt. Akron, O
E. T. AFFLECK, General Passenger Ag't, Columbus, O.

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7:10A.M. LIGHTNING EXPRESS, (daily,) sleeping and hotel coaches from Leavittsburg. 8:55 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p.m.; Buffalo, 6:15 p.m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p.m., (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

10:45 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown 1:45 a.m.; Meadville, 3:50 a.m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a.m.; Rochester, 1:10 p.m.; Hornellsville, 11:20 a.m.; Corning, 12:58 p.m.; Elmira, 1:21 p.m.; Binghampton, 2:50 p.m.; New York, 9:25 p.m.

2:30 P.M. PITTSBURGH EXPRESS,—daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m.; Washington, 7:30 a.m.; Baltimore, 8:19 a.m.; via Sharon and Meadville, 7:00 p. m.

4:25 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p.m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p. m.

7:10 A.M. PITTSBURGH EXPRESS,—(daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a.m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:13 p.m. and 4:20 p.m.

11:00 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:50 a.m., 7:00 p.m., 10:55 a. m. 2:00 p.m., and 10:15 p.m.

This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

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Following is time of local trains now running:

GOING EAST.

	Local Passenger.	Local Passenger	Con'eaut Accom.
Leave			
Chicago	8 10 am	.....	.....
So. Chicago	9 53	.....	.....
Valparaiso	10 08	.....	.....
Ar. Ft. Wayne	1 50 pm	.....	.....
Ft. Wayne	2 10	.....	.....
New Haven	2 25	.....	.....
West Leipsic	4 29	.....	.....
Arcadia	5 30	.....	.....
Fostoria	5 45	.....	.....
Green Springs.	6 32	.....	.....
Bellevue	7 10	6 45 am	.....
Vermillion	8 16	7 42	.....
Lorain	8 41	8 07	.....
Ar Cleveland	10 00 pm	9 18	.....
Lv Cleveland	.....	9 23	4 30 pm
Euclid Ave	.....	9 40	4 47
Mentor	.....	10 20	5 27
Painesville	.....	10 35	5 40
Ashtabula	.....	11 34	6 37
Conneaut	.....	12 05 pm	7 05
Erie	.....	1 18	.....
Dunkirk	.....	3 05	.....
Ar. Buffalo	.....	4 50	.....

GOING WEST.

	Local Passenger.	Local Passenger	Con'eaut Accom.
Leave			
Buffalo	8 00 am	.....	.....
Dunkirk	8 52	.....	.....
Erie	11 46	.....	.....
Conneaut	12 55 pm	.....	6 30 am
Ashtabula	1 27	.....	7 00
Painesville	2 28	.....	7 55
Mentor	2 43	.....	8 08
Euclid Ave.	3 26	.....	8 48
Ar Cleveland	3 43	.....	9 05
Lv Cleveland	3 48	6 55 am	.....
Lorain	4 58	8 07	.....
Vermillion	5 20	8 30	.....
Bellevue	6 15	9 40	.....
Green Springs	.....	10 15	.....
Fostoria	.....	11 00	.....
Arcadia	.....	11 15	.....
West Leipsic	.....	12 18 pm	.....
New Haven	.....	2 25	.....
Ar Ft Wayne	.....	2 45	.....
Lv Ft Wayne	.....	3 05	.....
Valparaiso	.....	6 58	.....
So Chicago	.....	8 24	.....
Chicago	.....	9 00	.....

Trains run by Columbus time.

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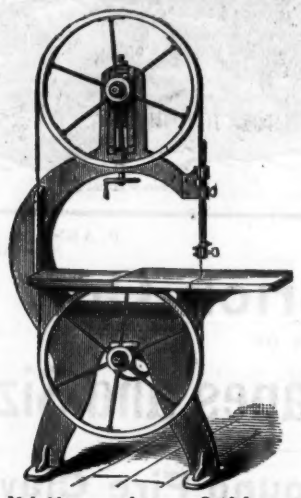

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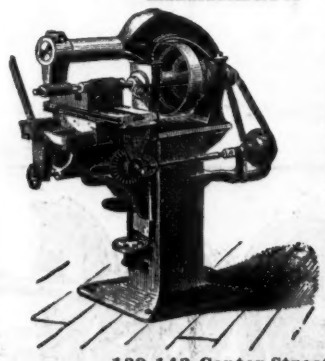

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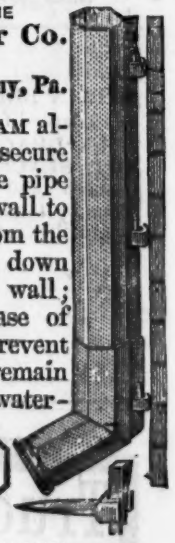

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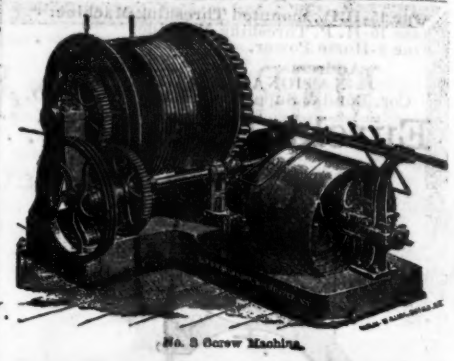
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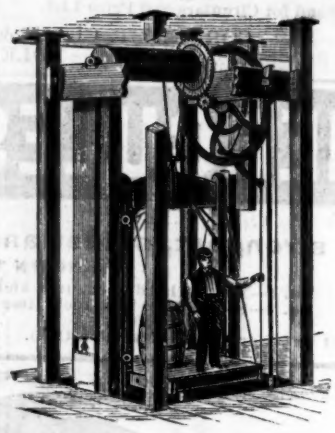

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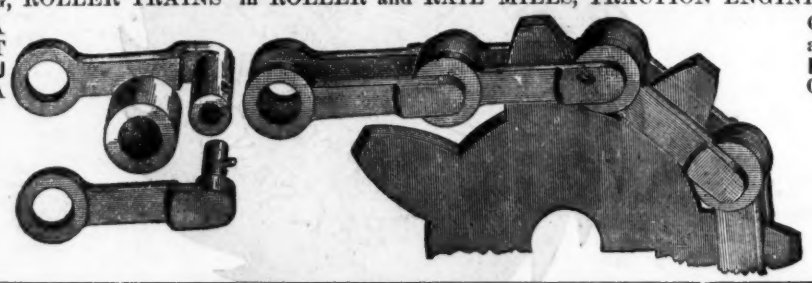

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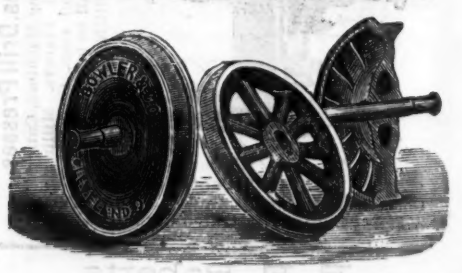

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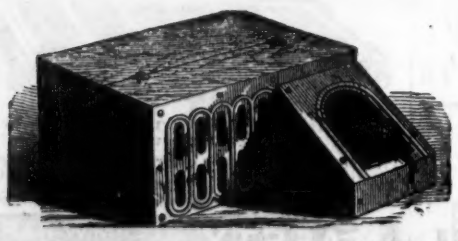

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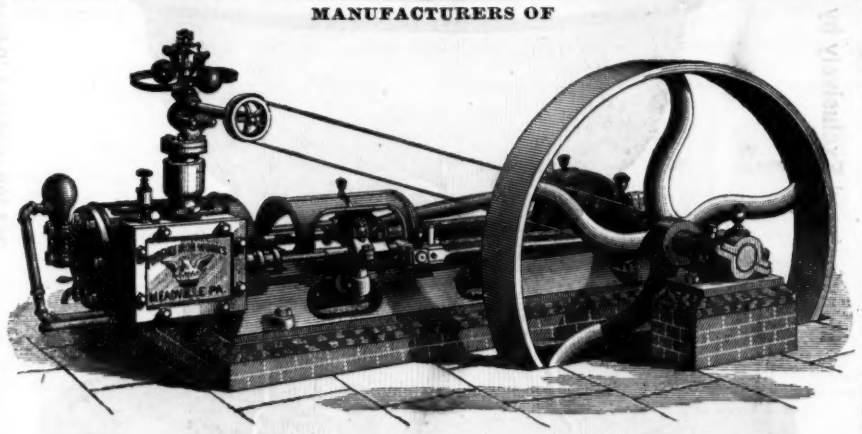

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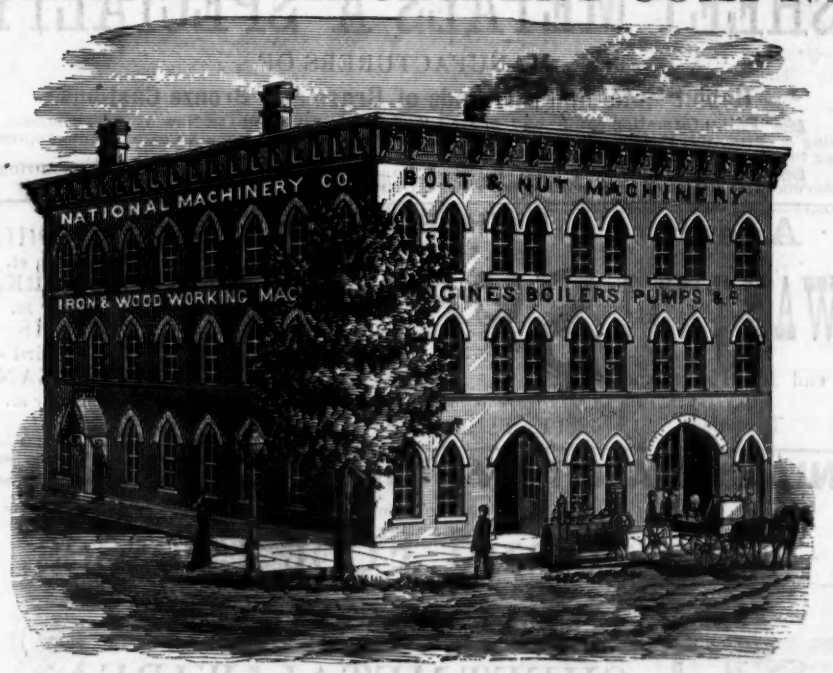

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FIVE SIZES OF THE FOLLOWING PROPORTIONS:

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No. 7, XX 34 inches in diameter, 4 feet high	weight 372 lbs.
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No. 9, XX 36 inches in diameter, 4 feet 9 inches high	weight 818 lbs.

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